School Shop

vol. XIX no. 10

JUNE 1960

A Call to Industrial Arts
by Delmar W. Olson

The 1903 Delton
by Robert Dello-Russo and Bjarne Tonnesen

Explosive Forming
by John E. DeWald

Cover Story: Gene Fong (below left) and Richard Mendosa making a hardness test of a metal. Both of these young men are students in a unique program of pre-engineering machine shop taught at Castlemont High School, Oakland, Calif. This report is on page 12.

THE MAGAZINE FOR TEACHERS OF INDUSTRIAL EDUCATION

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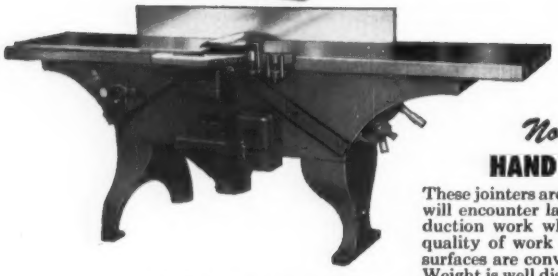

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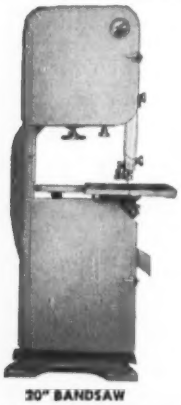

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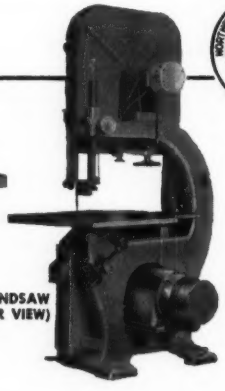
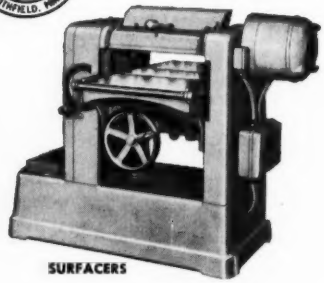


36" BANDSAW (REAR VIEW)



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School Shop

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Course-of-Study Standards Needed

Courses of study have been a source of interest to educators for many years. Books and pamphlets have been written on the subject, school staffs have labored over them, and the brethren have met in innumerable conferences for the purpose of pooling their ideas on what should be included in them.

These efforts have resulted in a host of courses, some good, and others not so good. However, their standard of excellence should be determined by the extent to which they were prepared specifically for conditions that were known. Were the time and equipment available for the course considered and were the pupils beginners or were they advanced? Such factors as these must be kept in mind if the course being prepared is to be suitable for the group to be taught.

While this is true for a specific situation, we are wondering if it would not be helpful if the drafting teachers in each state, for instance, could agree on an outline which would include all of the principles that might be taught in mechanical drawing, extending up to the twelfth grade. The items included would then be arranged in a sequential teaching order, and then divided into groups, such as drawing I, II, III, and IV—not grades 9, 10, 11, and 12.

If an outline of this type were available in the state, each teacher would select from it the items suitable for the pupils in any particular class. By this means all teachers teaching a beginning group would be teaching the same principles, regardless of the grade classification of the class. He would select the text he wished to use and he would use whatever teaching methods he felt to be the most effective.

Another advantage of this plan would be that no pupil would be accepted in a more advanced section unless he could produce evidence that he had completed satisfactorily the sections that preceded it. Then, too, since all teachers of drawing would be teaching the same principles in their appropriate sections, the transfer of pupils from one school to another would be facilitated.

Objections may be raised to a scheme of this kind on the ground that some pupils may complete the assigned work in a section before the end of the term, while others may not have completed it by that time. However, the alert teacher can always find additional problems which call for the application of the principles included in his outline. This provides the pupil with additional practice in the area in which he is supposed to be working and discourages some teachers from introducing material that is scheduled for the next higher section. In regard to the slower pupil, even if he is advanced a grade, he will be required to complete the required work in drawing I before he will be permitted to start on drawing II.

All this suggests that a standard course of study should be prepared which covers all of the principles to be taught in a subject and that these principles should be divided into sections of increasing difficulty, each one containing enough material for a semester's work. This does not mean that the teacher should be regimented. He selects from the appropriate section in the general outline the principles he feels he can teach in the time and with the facilities he has; he selects his own textbook, and he uses his own methods. The only limitation is that he is expected to keep within the area prescribed for the type of class he is teaching.

One of the advantages of this plan is that it may discourage some teachers, who wish to appear profound, from including in an earlier course more difficult problems that belong in a later one. Another advantage lies in the fact that it will enable the teacher of drawing I, II, III, or IV, for instance, to determine what he can expect his pupils to know when they enter his class. This makes it unnecessary for him to repeat what has been covered in a previous section, nor need he introduce material that is planned for a succeeding section.—*T.D.*

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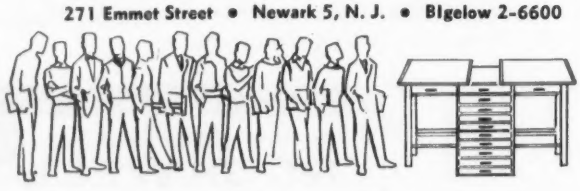

IN THE MORNING MAIL...

(Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir:

I would like to compliment you on the quality of SCHOOL SHOP, especially the April issue which arrived today. The articles on public relations are very informative and the letter from "Hopeful Mother" will give many teachers, including myself, plenty of food for thought.

Gene Kampa,
Union School District,
Danville, Calif.

Dear Sir:

The editorial in the March issue by T. D. on "Giving Depth to Industrial Arts" is indeed timely. . . . Our scheme of general shops, in which we attempt to teach many things but really not much of anything, makes it difficult if not impossible to integrate the industrial-arts and the vocational high-school shop courses so the pupil gets little help in making his choice of high-school course. Our fuzzy scheme of craft, or "super-art" shops, does not have the guidance opportunities so successfully used by good teachers through the old unit or single-subject shops. It was through pupil experience in such activities that they were able to select their high-school or vocational-school course without losing a year, as at present, because the exploratory work was completed in the junior-high school instead of the tenth grade. . . .

In some cities, school authorities cannot decide whether to set up vocational or comprehensive or technical high schools. They seem desirous of offering trade and technical training without modifying the high-school curriculum. One very fine community in south Florida seems to infer that the answer lies in industrial arts. Local industry is growing very rapidly and trade education would undoubtedly vitalize this growth. . . . I am inclined to agree with this school superintendent that an industrial-arts program may be the answer, *but* this will have to be a program of *unit* shops from the seventh through the twelfth grade so there would be no need to water down the curriculum. These shops should be manned by the type of teacher suggested in the editorial by T. D. —men who are wisely chosen for what they can *do*, not for how many degrees they have. There should be little difference in the qualifications for these men and those teaching in a vocational high school.

Few will doubt the need for improvement and progress in our programs of trade, technical, and scientific training, but all the talk, publicity, and money spent on beautiful buildings will do little unless there is a qualified teacher who knows his subject and whose *pupils know he knows it.*

Harry G. Steinroeder,
Chairman, Industrial Arts Department,
William J. Gaynor Junior High School,
Brooklyn, N. Y.

Dear Sir:

I appreciated the article on "Guides for Establishing Technical Institutes" in the February issue. . . . Thanks to you and your staff for the continuing good work of SCHOOL SHOP.

New York State Education Department,
C. Thomas Olivo,
Albany.

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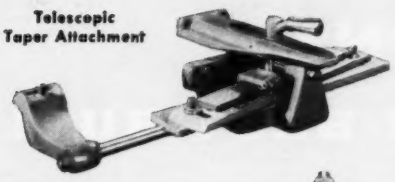

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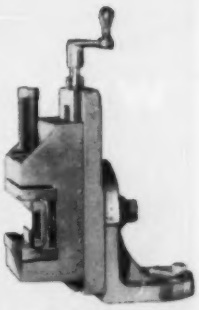

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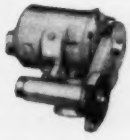

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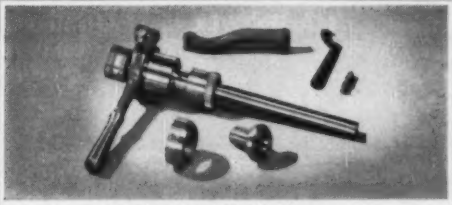

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Handwheel Collet Attachment

Collets

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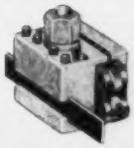

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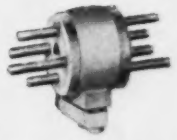

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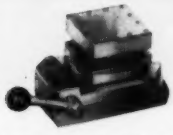

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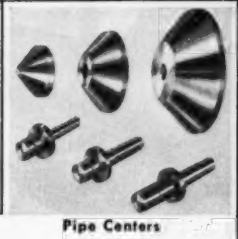

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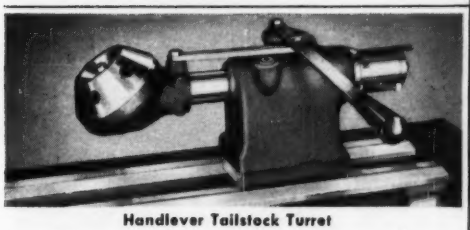

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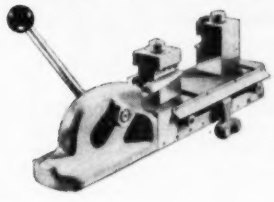

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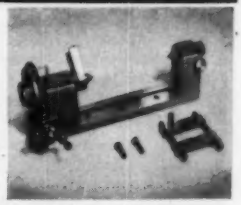

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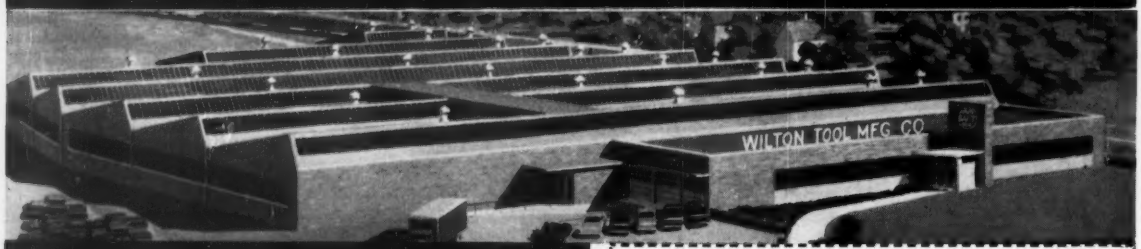

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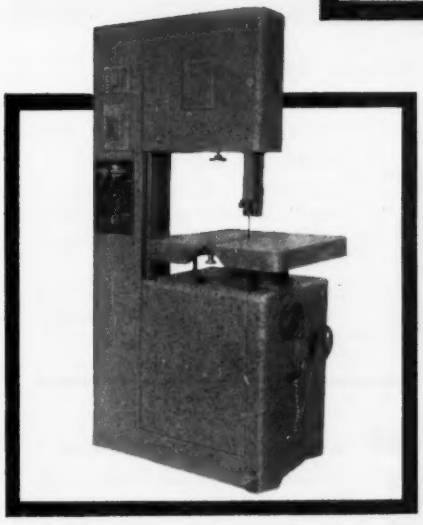

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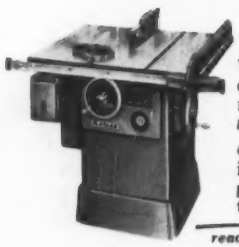

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A statement of basis for change

A Call to Industrial Arts

By Delmar W. Olson
Professor of Industrial Arts, Kent, Ohio, State University

THE "call to industrialization" for American industrial arts was made at the beginning of this century. Its "call to intellectualization" is being made now, at the outset of the second 50 years. The original call we were unable to understand. Consequently, we did not accept it. Because we did not understand industrialization, will we not be less able to comprehend intellectualization? A midcentury analysis of industrial arts shows it to be at the stage of development where we are ready to accept the first call. We must, therefore, weigh the consequences of the so-far unheeded second call.

In Retrospect

When Charles R. Richards in 1904 made his now classic proposal of the title "industrial arts," he did it because he saw manual training as elements of the industries fundamental to modern civilization and these elements as a body of ideas of fundamental meaning and importance. As such, they constituted a body of subject matter. Although Richards did not propose a new curriculum, the new title did imply a new basis for justification for educational shopwork with the elements of industry as subject matter.

Charles A. Bennett accepted the industries concept but proposed five groups of manual arts as representative: the graphic arts, the plastic arts, the mechanic arts, the textile arts, and the bookmaking arts.

It remained for Frederick Gordon Bonser to clarify the industrial concept of industrial arts. He did this with a definition which has stood as the great unifying force among differing opinions for nearly half a century. He proposed the industrial arts as a study of changes made by man in the forms of material to increase their value and usefulness to him, and their influence on his life. Bonser called the changes, and the occupations involved, industries or industrial arts.

John Dewey, during this same period while attempting to find meaning in manual training and shopwork, saw them as groups of processes which society used to keep itself in operation, as methods to acquaint the child with some of the necessities of community life, and as the way these necessities were satisfied by man's insight and ingenuity. Dewey saw them as means for making school life an active part of community life.

In 1934 the acceptance of the call to industrialization was made through the monumental document, *A Prospectus for Industrial Arts in Ohio.* This document proposed technology as the curriculum for industrial arts. Here and there, as it was understood, it was applied. The impact of this concept has been felt, even though faintly, around the world. The move to industrialization, however, was slowed to a stop because World War II drew the leaders away.

All told, it appears that the call to industrial arts to accept the elements of industry as subject matter, for industrial arts to become a study of industries and to see them as socializing agencies, was rather distinct.

During the first 50 years, however, industrial arts did not reach the level of industrialization. It grew to the manual-arts stage and settled there. Since then its efforts have been largely toward refining and perfecting these arts, toward searching for more efficient methods of teaching these arts, and toward clarifying the meanings originally assigned to them so that they could be made educationally acceptable.

American Industry: 1900-1950

The first 50 years of the twentieth century in the United States produced the most spectacular technological development in all of history. Today, we can look back in history and review that parade of progress. The first 50 years was a period of mechanization and electrification during which the professional engineer, the professional chemist, and the professional inventor were born. Science came into respectability.

As a nation we started the century with almost no automobiles. Since then we have produced many millions of cars. At the turn of the last century we did not have any radios, home mechanical refrigerators, airplanes, sliced and wrapped bread, plastics, parcel-post system, farm tractors, safety glass, nor thousands of other products that have come and gone.

Mobilization of this growing industrial might has been the decisive factor in swinging the balance of power in favor of the freedom loving nations following two world wars. Some 68 million Americans are now directly employed in this country's industries. Dozens of man-made materials have been created and discovered, including elements as science tapped the energy store of the atom.

Perhaps even more important, however, than the achievements noted above, is the new spirit of industry which began to show itself at the midpoint of the century, the spirit which insists: What man can conceive of, industry can produce. It is the resource of the human intellect. Its power potential is unknown and unlimited. Its goal is the freeing of humanity from lower levels of materials enslavement. Its contribution will be to release man to a freedom for his full growth and development and for which it will even provide him necessary material aids. Even now the American worker has as much time for leisure as the amount of time he spends at his job. Technology is providing him with work and, at the same time, with leisure.

Where Dewey saw industry as furnishing the necessities of life, industry now first creates the needs and then supplies the necessities to satisfy them. Where the first 50 years saw the mechanization and electrification of production, the second 50 years is seeing mechanization and electrification of controls. The highest level of intellect, creative imagination, is producing machines and systems capable of selfthinking through selfcontrol, selfregulation, and selfcorrection.

A Period of Decision

The second half of this century is the period of decision for industrial arts. It is a decision for survival. Now it will have to be decided whether industrial arts is really essential to American education. Up until now industrial arts has not proved itself indispensable to general education, even though we have claimed it to be. Up until now industrial arts has

been geared to make its greatest appeal to the slower learners and the noncollege group through its emphasis on manual ability. Parents still see it as something handy for boys to know and to do, but parents rarely see it in the same light as academic subjects: as a measure of the real growth and development of their children.

Industrial-arts teachers increasingly complain about their shops being dumping grounds for children who cannot succeed in other courses. Complaints of this nature, however, are hardly in order because we have deliberately, if unwittingly, set our program for this level. The Conant Report, in assessing the American high school, does not name industrial arts as an essential part of the whole, even though it does stress all-round development of the student. Few American universities recognize industrial arts by including it as one of the liberal arts which generally constitute the general-education program on the collegiate level.

For 50 years we have busied ourselves taking problems out of the industrial-arts project to eliminate chances for pupil error. At the same time we have removed opportunities for thinking creatively, for personal individuality, for inventiveness, and for responsibility for having a better idea. In short, we have removed the germ of human growth and development and left a sterile physical activity. And, because there is activity, we have assumed there is learning *ipso facto*. For so long have we proclaimed learning by doing as the mark of perfect education, and as a unique quality of industrial arts, that we have actually convinced ourselves of its rightness. In the process, though, we have overlooked the nature of the doing; perhaps thinking it is insignificant. To give "doing" academic esteem, however, we administer small doses of our related information.

One wonders why industrial arts has not chosen to put faith in the intelligence of the student and proclaimed a learning by thinking. Of all school subjects, none, probably, has greater inherent potential for truly liberating the human mind through a search for truth than has industrial arts. Here is the great, world-wide laboratory for discovering, for creating, for experimenting, for inventing and designing, for putting to work those native human talents of having ideas and then developing them. How can we properly be more concerned with the quality of shavings than with development of human talents?

Here is the call to intellectualize industrial arts, to Americanize it. When we find what it is that the American has that makes America great, will it not be that spirit which keeps driving him to find a better idea, a better solution to a problem?

In America we honor the past but we worship the future. Only when we put this spirit to work in industrial arts will we be able to develop an educational program which really assists in producing the kind of American who contributes toward making this country great. Only then can we prove to ourselves that industrial arts, as we have known it, has not really made needed contributions to American education, contributions we have in the past assumed. Only then will we be willing and able to rethink the objectives and methods to which we have been so long dedicated.

Technology: The New Curriculum

If industrial arts will be concerned with study of American industry and its influence on living, then its curriculum will be the technology—the body of science, techniques, and skills—peculiar to industries. Since Richard's day, industry has grown from an art to a science. Manipulative skills of the craftsman have become precision machine operations. The machine operator has become a systems technician; and because of it all, because of American technology, we have the highest standard of living in all the world, even though we may not yet know how to use it for fullest enjoyment.

If we will construct our program for the technology, then we must conceive of a subject matter representative of the new industry, as well as appropriate to the new leisure.

If we will undertake a curriculum from technology, we must industrialize, and especially intellectualize, industrial arts. For 50 years we have carried along the elements of the industries of 1900 as fundamentals for industrial arts. At the same time we have remained oblivious to a fundamental characteristic of American industry: continuous change resulting from a continuing search for the better. We have thus become a body of professional caretakers who are devoted to perpetuation of obsolescence.

If we believe it is essential for American youth to understand the American way of life, we must then understand the technology. The first step toward this understanding is searching out elements of industry which are genuinely fundamental to and representative of it. These elements should be our guides.

If industrial arts will become an essential part of American general education, then it must have this new curriculum supported by *new* meanings, *new* purposes, *new* teachers, *new* students, *new* facilities, and—obviously—*new* projects. All of this suggests an industrial revolution within industrial arts.

Let us face up to ourselves, to our prejudices and biases, as we look to the future. Let us find a unity in our mission, a unity based on our answers to the question: Just what should we be doing for the boy and the girl if we want them to develop into the kinds of people needed to keep America great and to increase its greatness?

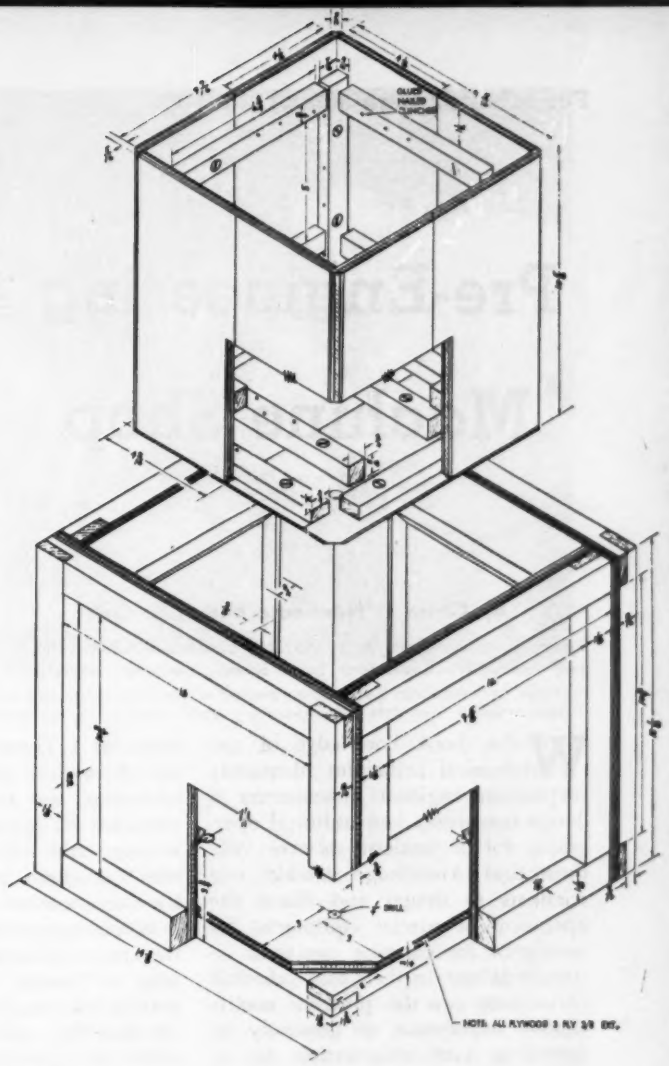
It seems to me that we have little choice. Either we rethink industrial arts so that it makes full educational sense in the American culture or we will be reduced to a program of caretaking for the slower children. The latter role we are now set up to play, and we should rejoice that industrial arts can help these people when no other school subject can. If this is our only mission—our one great contribution to American education—then let us take that mission seriously and serve it accordingly. I propose that we take a new look at our mission and, in so doing, cut ourselves free from our ties to the past and look ahead to a service which cannot yet be fully seen but which, our faith in the basic concept of industrial arts tells us, is there. Only then can we strike out with a bold new program that we can honestly know all America needs.

The term industrial arts might not accurately describe the new curriculum and its three facets. The first facet, designed for its general-education contributions, could include the industrial arts and sciences. Another facet of the new curriculum, to serve the leisure-time needs of America, might be named "industrial-arts recreation." The third facet, to serve the handicapped, could be known as "manual arts," for it would be truly that. With this three-faceted approach to a curriculum reflecting technology, we should have the means to effectively serve America's educational needs. ★

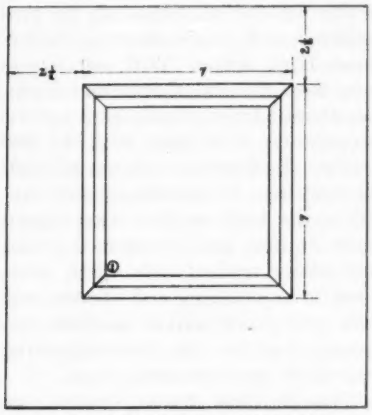
Several processes are needed

Concrete Flower Box

By C. L. McConnell
John Marshall High School, Los Angeles, Calif.

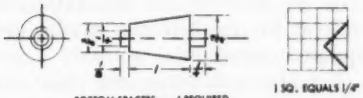


BEING in need of a number of large flower pots, a visit to the nursery merely revealed that such items were quite expensive. The solution to this problem was the concrete form illustrated in the accompanying drawings.



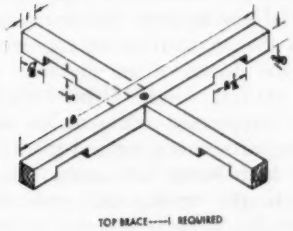
INSIDE DETAIL OF OUTER WALL | MITER JOINT 45°

TYPICAL SIDE VIEW OF INSIDE WALL



BOTTOM SPACERS—4 REQUIRED

1 SQ. EQUALS 1/4"



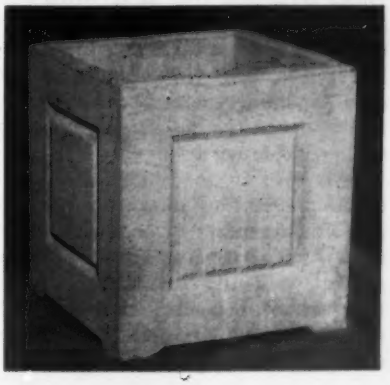
TOP BRACE—1 REQUIRED

The outside forms pose no problem since they are made in sections and are held together by means of carriage clamps or screws. Ornamentation can be provided by nailing V-shaped strips in the form of a panel on each outside section. The inside forms do present a problem if they are to be removed to be used over again. This can be solved by making each section in two parts with the center beveled and secured together by cleats. One side of the cleat was securely fastened to one of the half sections and screwed to the other. By removing the screws, the two sections can be buckled in and removed.

The two bottom forms are spaced by means of turned, beveled spacers fitted into corresponding holes in the bottom forms. These spacers, when pushed out, form the weep holes for drainage. The inside forms are held together by ¾", No. 20 brads, one in each side, and spaced from the outside forms by means of the notched cross brace shown.

One part cement to two parts sand, and water added until the mixture is very fluid, is about right. Color can be added as desired. One-quarter inch, mesh hardware cloth strips should be inserted in the corners at the top for added strength. ★

A finished concrete flower box. Designs and color can vary to suit your needs.



For talented high-school students

Pre-Engineering Machine Shop

By Glenn I. Newhouse and Irvin Colt

Supervisor of Industrial Arts, Oakland, California, Public Schools; and, Instructor, Castlemont High School, Oakland, respectively

Roger Decker, a student at Castlemont High School and a member of the special pre-engineering course, carefully measuring parts of a steam engine with a micrometer as he computes the horsepower.

WILL book knowledge of mechanical principles adequately prepare our engineers of tomorrow to design machinery and technical operations for a modern society? Will theoretical knowledge enable our scientists to design and direct the operation of special equipment for testing or for carrying out their research? Where in their busy schedule of learning can this practical manipulative experience, so generally accepted as vital information, be acquired?

Engineers and scientists who possess only a theoretical knowledge of their fields face many difficulties not present for men of similar education who have had manipulative mechanical experiences. This fact has long been known and appreciated. Most American universities and colleges that prepare engineers have operated machine-metal shops where students have gained practical manipulative experiences with hand and machine tools. With the increasing demands for students of technical professions to have a more liberal education, however, courses in machine-metal shop experiences have become fewer, and in some instances have been dropped completely.

This void in the students' educational preparation presents a serious problem for future engineers, for their profession, and for society in general. Students, parents, and sometimes school counselors are not aware of the vital importance of practical manipulative experiences in giving a basis for a better understanding of the theoretical phases of technical education, and in providing an opportunity to apply the mathematics, science, and other subject matter which students have learned in a life-like situation.

While many of our leading universities encourage students who are planning to become engineers or scientists to take machine-metal, mechanical drawing, and other shop classes while in high school, relatively few students are able to follow this advice. Often this is because of the many curriculum requirements for high-school graduation, which leaves the college-bound student little time for electives. In an attempt to fit this manipulative training into the college-preparatory student's program, we set up a pilot program for future engineers and scientists: a pre-engineering machine-shop course which was conducted at Castlemont High School in Oakland, California.

This class is a special one-year course, combining projects, experiments, field trips, homework, and library study, intended to offer to academically talented and selected students the maximum amount possible of manipulative experiences and understanding. At the end of the *first semester* of this experiment, it was found that these academically talented students not only had greatly exceeded the amount of required work done by the regular *second-year* machine-metal shop students but had, in addition, done intensive study into the relationships and principles involved.

Staff Cooperation

The development and ready success of this venture is a tribute to the professional staff cooperation at Castlemont High School. With encouragement from the central office and the local school administrators, plus careful preparation and hard work by the teacher, the first class was started with 29 students. To secure capable students, the local mathematics department notified and encouraged junior and senior students who were interested in engineering and science, and who were doing well in mathematics, to sign up for this pre-engineering course in machine-metal shop.

One hundred forty students expressed a desire to enrol in such a class. Each student was interviewed by the machine-metal shop teacher. The criterions for selection were the student's vocational objective, his probable chance of profiting from this class, his interest and motivation, as well as his mathematics grades and apparent mechanical aptitude.

Valuable counseling took place during student interviews with the industrial-arts teacher. To many applicants, the preparation for engineering and the duties of an engineer were not entirely clear. Other students were completely confused. To some, an engineer was a rugged giant who wore high boots and could lick any man in the construction crew. Consequently, a great amount of voca-

tional information was transmitted during these selection interviews.

A number of students considerably in excess of a desirable class size were selected, since it was anticipated that program conflicts and changes in plans would remove some students from the enrolment list. The class started with more than the desired number of students. The median IQ of the students enrolled was 118, the range ran from 94 to 132. Student motivation was excellent, and Oakland educators were well pleased with the operation of this new project. More careful selection has been practiced in choosing the students for similar classes this year. The median IQ score of these classes is 121, with a range from 100 to 149. Two classes of pre-engineering machine shop are now being conducted, and these classes are being held to a smaller size than was possible last year, with approximately 20 students each.

Jack Vance (left) and Ray Lindquist, students in the pre-engineering machine-shop course, checking crystalline composition of metals. They are using acid etch and a microscope.

Class Techniques and Procedures

The objective of the class and the procedures followed throughout the year are thoroughly explained to students at the beginning of the term. Able students display superior ability to visualize and appreciate distant goals or objectives. They do not object to completing a practice problem. This permits more extensive educational experiences. Frequently, when a student undertakes a new process or operates a machine that is new to him, an experimental or practice job is performed first to familiarize him with the new experience. Therefore, when he undertakes a step on his project that is essentially the same as he had previously completed on his practice job, his performance is better, he is more sure of himself, and the chance for complete understanding and a satisfactory completion of his objective is more likely.

Learning is implemented by applying his recently acquired knowledge to the same operation on his regular project. This method permits an extensive coverage of valuable operations and principles. Practical projects that appeal to, and are desired by, the student add to the impact of the course.

Class Organization

The class is divided evenly into two sections. Each student selects a partner from within his section. The student keeps his partner throughout the school term. This permits students to work in pairs when they perform their experiments and when doing their practice jobs on the machines. This method permits combined thinking and also encourages each student to check the other's calculations. What one overlooks the other may remember. This combination approach has proved an excellent procedure. While they work together, discuss the experiment as it develops, and pool their resources to complete it, each student must write up his findings independently. The student also works alone when working on his own project.

One-half of the class works on experiments while the other half is engaged in manipulative handwork and on the machines. This organization is necessary to fully utilize the shop equipment and to permit the shop instructor to distribute his time effectively.

Outline of the Course

The primary objectives of this course are: (1) to provide opportunities for exceptional students interested in the fields of science and engineering to learn the practical applications and principles of science and mathematics; and (2) to learn manipulative skills they will be required to perform and understand should they continue their educations in science or engineering. It is felt that this course will provide students with a basis for evaluating their abilities and interests in these areas.

A. *Mathematics (mathematics is the keystone of science and engineering; therefore this unit is part and parcel of all of the succeeding areas)*: (1) mensuration; (2) algebra; (3) geometry; and (4) trigonometry.

B. *Basic metallurgy.* — (1) materials; (2) structure; (3) cutting processes and theory; (4) heat treatment; and (5) stresses.

C. *Motion, force, and energy.* — (1) laws of motion; (2) basic mechanical principles; (3) inertia, mass, and measurement; (4) momentum, velocity, and vectors of motion; and (5) simple machines.

D. *Mechanisms.* — (1) gearing, cams, and linkage; (2) fasteners; (3) tapers and sine bar; (4) power transmission; and (5) mechanical applications and efficiency factors.

E. *Hydraulics and pneumatics.* — (1) laws of gases and liquids; (2) temperatures, pressures, and volumes; (3) heat engines; and (4) industrial applications.

F. *Related industrial processes.* — (1) planning and layout; (2) foundry and forging; (3) sheetmetal; (4) welding and brazing; and (5) mechanization and automation.

G. *Machining operations.* — (1) turning, boring, and threading; (2) milling and shaping; and (3) grinding and forming.

Manipulative skills in the use of hand and machine tools are developed through students' participation in making carefully selected projects requiring specific skills. Some of these projects are: a tap wrench, parallel clamp, C clamp, etc. In addition to

(*Continued on page* 28)

The 1903 Delton

By Robert Dello-Russo and Bjarne Tonnesen

Westfield, New Jersey, High School

THERE have been many projects constructed in industrial-arts shops where two or more boys have participated in its making and where *the project* was the end product. We felt that this left a great deal to be desired, not only on the amount of learning that takes place but also in the real educational significance of industrial arts. We felt that if we could hit on a group project that would permit us to use the facilities of not just one shop, but all of the industrial-arts shops in our program, we could expand the learning that would take place. This would mean that there would be many boys working on the same project in many areas. Picture if you can anywhere from 10 to 20 boys at a time, all working toward the development of one project, working in the machine shop, auto shop, mechanical drawing, and wood shop. This would mean that each boy would be held responsible for his particular part of the job. This would also mean that there would have to be precise coordination of the work from the various shops. Each shop would have to depend on the other for accuracy in the project.

After much consideration, we chose to develop the 1903 "Delton,"* an old-time car. The decision was based on these factors: There would be ample woodworking involved in the body, ample metalwork and machining in the chassis, ample automotive design, and excellent examples for mechanical drawing. We also felt that the few parts that could not be constructed could be easily obtained.

With these ideas we started. We worked out some sketches for the over-all appearance, chassis design, and a few over-all dimensions. After this we assigned group foremen in the particular shop areas. The foremen in turn selected their work crews. Several "high-level" conferences were held with the foremen, crew chiefs, and teachers. From these meetings came the car's design, not only in appearance but all basic dimensions, running gear, chassis layout, body layout, and type of construction to be used for each component.

Next, the drawings began to emerge from the drafting classes. Cardboard templates and patterns followed. These in turn went to the appropriate shop foremen and their work was started.

At this point, the real reward of this adventure began to take place. The boys all worked hard and very

*Delton never existed. It comes from the first three letters of the last names of the two instructors: Dello-Russo and Tonnesen.

enthusiastically. They all pitched in and did a tremendous job. As hard as they worked, the problems started to arise. The boys had set high standards for themselves and they found that living up to them was an arduous task.

For power, we used a modified lawnmower engine, which meant that we needed ample gear reduction to propel the car. After hours of calculations, the boys came up with a triple reduction that worked like this: an automatic clutch on the engine connected to a ball-bearing countershaft; then a chain drive connected to a large sprocket on the differential; then drive axles from a chain drive went to each wheel. An external brake band over a drum was used on the countershaft, braking through the differential.

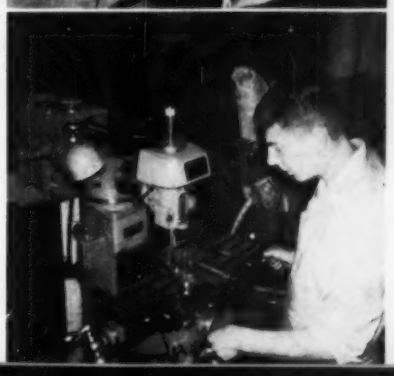
The front-end geometry offered many engineering problems. Caster, camber, and toe-in were designed into the unit. Toe-out in steering was also part of the design.

Because of the type of project it meant that many boys were working from one shop to another, checking, fitting, and generally working out the problems of building a car. Progress was rather slow for some time, and many of the boys had to take a good "ribbing" from other students about the "car they were building in shop."

Finally, one day we opened the large doors and four boys from the wood shop carried the body shell over to the auto shop and placed it on the chassis. The fit was perfect and for the first time "our baby" looked like a car. The boys all felt jubilant and chuckled over their accomplishment. From that moment on there was no stopping them; all pessimism ceased. From this time on it was "Let's get it finished."

At last the car took shape. The hand-rubbed body—finished with 12 coats of lacquer – glistened with the same brightness as the boys. Enthusiasm reigned supreme. We started the engine and, with two aboard, it purred off smoothly. The gearing was perfect, the brakes were smooth, the steering precise, and the coachwork was perfection itself.

Word soon got around. The car was displayed at Newark State College, a local bowling lane, local men's clothing stores, in school, and at the New Jersey Vocational and Industrial Arts Convention at Asbury Park. It is an experience that is still being drawn on for its educational values. ★



For seventh- and eighth-graders

Plastic Key Ring, Name Tag

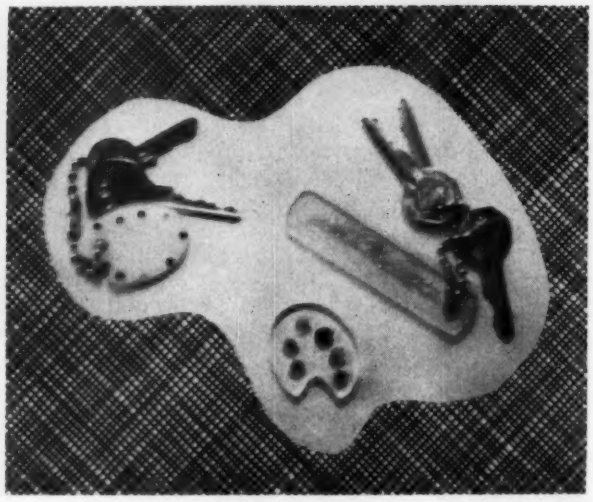
By Allen C. Willman
Washington Junior-High School, Duluth, Minnesota

TWO interesting projects using plastic are the illustrated name tag and key ring. Both of these projects are suitable for seventh-grade and eighth-grade pupils. The key ring (shaped as an artist's palette) involves only one thickness of plastic.

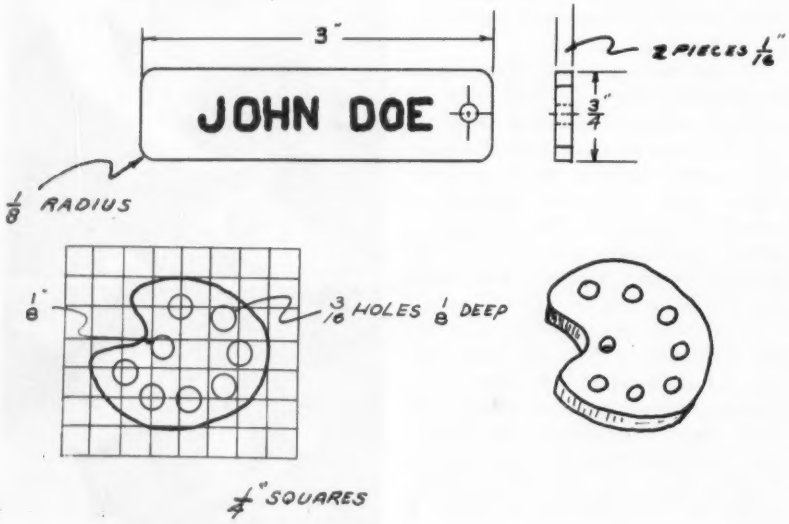
A few words about making the key ring. After the stock has been selected, the design laid out, cut out, filed and sanded, the holes should be drilled for the colored dots. Their size and depth is optional. It is best to use plastic dye, making certain, however, the holes are clean and dry. If plastic dyes are not available, regular coloring crayons can be substituted.

The beauty of this simple project is that youngsters who are not particularly dexterous with their hands can still make it and, in making it, use most of the tools and procedures used for plastic items in general.

The tricky part about making the name tag – it can also be used as a key ring – is cementing two pieces of plastic together after the lad's name – or whatever name he wants to use – is written into one piece of plastic using a vibrating tool or a wood-burning set. It should be mentioned, too, that the inscribed name can be filled in with bright colored paint so that it will stand out through the second piece of plastic. Wipe off the excess paint.



At right are the plastic key ring and name tag that are ideal plastic projects for young students of all abilities.



To cement the two pieces together do the following:

Put a very small amount of ethylene dichloride in a shallow pan, enough to merely wet the bottom of the piece of plastic, not immerse it. Make certain the ethylene dichloride does not touch the piece of plastic with paint on it. Allow the pieces of plastic to remain in the chemical for one to two minutes, or until the bottom becomes soft. Remove it from the ethylene dichloride and stick the two pieces together. Do not move the two pieces any more than is necessary.

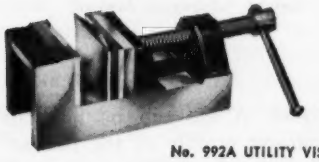
To bond the two pieces, place them in a wood vise and tighten it until all of the air leaves the joint. A good rule of thumb – really, finger – is to tighten the vise "finger tight" and then take 1½ turns more. Remove finger first, though! Allow the plastic to remain in the vise until completely dry; about 10 minutes.

The name tag can now be finished by cutting it to exact size, drilling the holes, sanding and polishing edges, and applying a coat of wax. ★

82-N

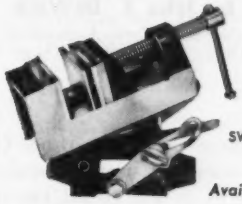
STANLEY SHOP TALK

NEW! STANLEY-YANKEE VISES FOR BENCH AND MACHINE WORK

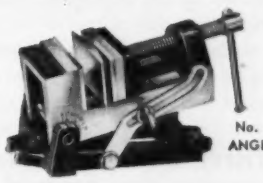


No. 992A UTILITY VISE

Features exclusive removable swivel jaw for holding tapered and irregular shapes firmly. Steel jaw faces are hardened and ground. Accurately machined on all sides and can be used on either side or end as well as base for special operations.



No. 4992A SWIVEL-TILT VISE



No. 3992A ANGLE VISE

Available in two sizes—2¼" and 3" jaws.

Combines swivel base and detachable angle base for angle set-ups; useful for toolroom or production work. Dovetail slot and cam lever clamp permits vise to be instantly adjustable the full length of dovetail slot while retaining the swivel feature.

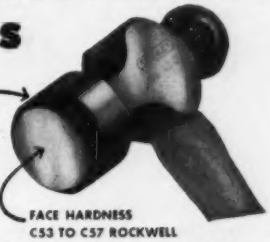
Can be adjusted to full 90 degrees or lowered and used as ordinary vise when horizontal. Accurate graduations indicate angle. And angle is quickly set and locked in position with thumb screw. All parts machined of high quality materials.

NEW ADDED SAFETY IN HAMMERS

16 oz. Steelmaster No. ST 1-1/2

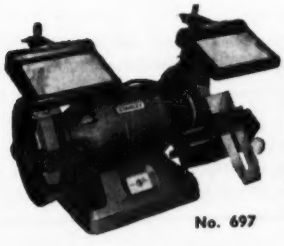
24 oz. Ball Pein No. 312

12 oz. Tinner's Riveting No. 462



Induction coil rim tempered face minimizes chipping for many types of Stanley hammers. Rim tempering is not visible after polishing—but it does offer built-in safety.

NEW BENCH GRINDER



No. 697

Especially designed for the school shop. The grinding attachment is for all chisels and plane irons up to 2⅜" wide. Equipped with "Flud-Lite" Eye Shields that cannot be moved to non-guarding position.

Cabinet-type Pedestal No. 626 available.

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Explosive Forming

By John E. DeWald

Engineering Design Division, U. S. Army Ordnance Tank-Automotive Command, Detroit, Michigan, Arsenal; formerly Marysville, Michigan, High School

EXPLOSIVE forming uses the force of expanding gases generated by firing a blank cartridge to form a metal part.[1]

The nature of this process of forming metal permits metals to be moved at from 100" to 300" per second, in contrast to a rate of 1" to 10" per second by conventional pressworking. Stresses under this technique are over a very short period in time. Consequently, dies and support equipment are reduced to the barest essentials.[2]

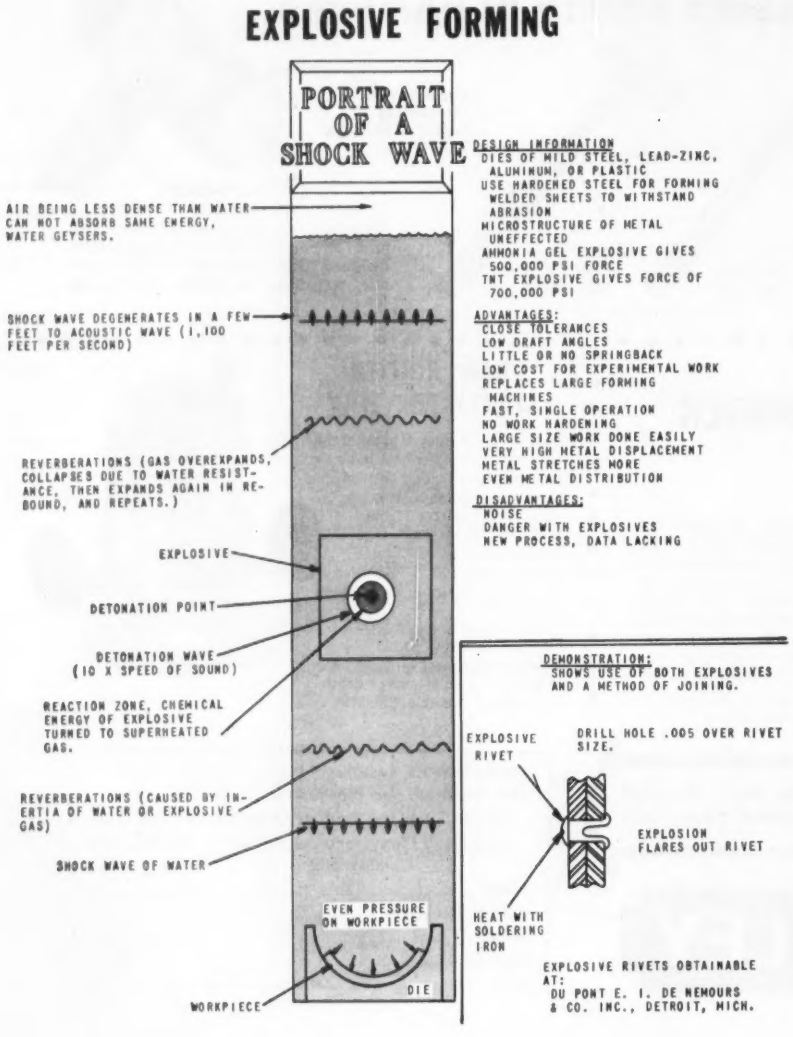
Forming is done by a shock wave (see illustration), by gas pressure, a combination of the two, or by gas pressure acting indirectly through a liquid such as oil, or driving a piston.[3]

Bulge forming is done by shock wave, by gas expansion, or through a liquid. A die can be fabricated to conform exactly to the outline of a desired shape.[4] Some of the metallurgical effects of explosive forming are:

1. Spring-back, in even the most difficult to form metals, is eliminated.
2. The ultimate strengths of some metals are increased up to about 50 percent at loading rates of only 200 fps.
3. The compressive-yield strengths of some steels are increased as high as 300 percent.
4. Aluminum, for example, has been hardened as much as 95 percent without any change in grain size.
5. Carbon steel has been elongated to 70 percent by explosive forming as against the 42 percent limit.[5]

Under the high strain rates of explosive forming, metals are formed *plastically*, moving through the elastic and into the plastic range (without becoming fluid), and take a permanent set with extreme speed.

The ability of a material to be explosively formed is a function of elongation, and the following relationships have been found, 1.0 being equal to conventional elongation: nickel, 1.0; stainless steel, 1.1; titanium, 1.5; tool steels, 2.0+; magnesium, 2.0+; plain carbon steels, 2.3; aluminum, 2.5.[6] ★


EXPLOSIVE FORMING
PORTRAIT OF A SHOCK WAVE
AIR BEING LESS DENSE THAN WATER CAN NOT ABSORB SAME ENERGY, WATER GEYSERS.
SHOCK WAVE DEGENERATES IN A FEW FEET TO ACOUSTIC WAVE (1,100 FEET PER SECOND)
REVERBERATIONS (GAS OVEREXPANDS, COLLAPSES DUE TO WATER RESISTANCE, THEN EXPANDS AGAIN IN REBOUND, AND REPEATS.)
EXPLOSIVE
DETONATION POINT
DETONATION WAVE (10 X SPEED OF SOUND)
REACTION ZONE, CHEMICAL ENERGY OF EXPLOSIVE TURNED TO SUPERHEATED GAS.
REVERBERATIONS (CAUSED BY INERTIA OF WATER OR EXPLOSIVE GAS)
SHOCK WAVE OF WATER
EVEN PRESSURE ON WORKPIECE
DIE
WORKPIECE
DESIGN INFORMATION
DIES OF MILD STEEL, LEAD-ZINC, ALUMINUM, OR PLASTIC
USE HARDENED STEEL FOR FORMING
WELDED SHEETS TO WITHSTAND ABRASION
MICROSTRUCTURE OF METAL UNEFFECTED
AMMONIA GEL EXPLOSIVE GIVES 500,000 PSI FORCE
TNT EXPLOSIVE GIVES FORCE OF 700,000 PSI
ADVANTAGES:
CLOSE TOLERANCES
LOW DRAFT ANGLES
LITTLE OR NO SPRINGBACK
LOW COST FOR EXPERIMENTAL WORK
REPLACES LARGE FORMING MACHINES
FAST, SINGLE OPERATION
NO WORK HARDENING
LARGE SIZE WORK DONE EASILY
VERY HIGH METAL DISPLACEMENT
METAL STRETCHES MORE EVEN METAL DISTRIBUTION
DISADVANTAGES:
NOISE
DANGER WITH EXPLOSIVES
NEW PROCESS, DATA LACKING
DEMONSTRATION:
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EXPLOSIVE RIVETS OBTAINABLE AT:
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[1] *Tool Engineers Handbook* (2nd ed.; New York: McGraw-Hill Book Co., Inc., 1959), p. 55-25.
[2] *Loc. cit.*
[3] *Loc. cit.*
[4] *Loc. cit.*
[5] *Loc. cit.*
[6] *Loc. cit.*

An Explanation

This description of explosive forming is published in SCHOOL SHOP to acquaint teachers and students with a newer industrial technique that is not usually carried on in shop classes but is becoming more important in industry. You will note that a class demonstration is suggested at the bottom of the drawing so you can show your students how explosive forming is done. ★

Electricity and electronics problems solved with

Science and Math in the Shop

By Arthur W. Bentz
Freehold, New Jersey, Regional High School

SINCE teaching electricity and electronics in industrial-arts departments of many junior-high and senior-high schools is becoming common, many questions about the conductivity of various metals arise. Many projects designed for industrial-arts students require use of nichrome wire for heating elements. When we were faced with this problem we decided to collect data about this metal.

Several of our students in their science classes looked up the composition of nichrome wire. This wire, they found, was an alloy composed of 75 percent nickel, 12 percent iron, 11 percent chromium, and 2 percent manganese. The specific resistance of this alloy was listed as 660 ohms per mil foot. From their mathematics books, the lads learned that a "mil foot" is the equivalent of a piece of wire .001" in diameter and 1' long.

From this data and other information gathered from tables in the *Amateur Radio Handbook*, the boys were able to make the following table of specific resistances of various sizes of nichrome.

Wire Gage	Resistance per foot (ohms)
#20	0.645
#22	1.030
#24	1.650
#26	2.649
#28	4.328
#30	6.529
#32	10.313
#34	16.575
#36	26.400

This table paved the way for us to present realistic mathematics problems to our industrial-arts students. Many of the problems are similar to the following:

"Find the number of feet of #28 nichrome wire necessary to make a 150-w electric soldering-iron element for use on a 120-v circuit." The solution follows:

From the above table it is determined that 1' of #28 nichrome wire has a resistance of 4.328 ohms. Next, the formula $I = \frac{W}{E}$—substituting 150 for W, 120 for E, and solving for I—shows the amperage to be 1.25. Then, the formula $R = \frac{E}{I}$ shows the resistance necessary to limit the current to 1.25 amps. is $R = \frac{120}{1.25}$, or 96 ohms. Finally, using the formula "length of wire in feet = $\frac{\text{resistance of the circuit}}{\text{resistance per foot}}$" it can be determined that the length of #28 nichrome wire needed for the electric soldering-iron element is $\frac{96}{4.328}$, or 22' 2".

Using this table, our students are able to design heating elements for many projects. Those students who helped compile the table earned the added reward of realizing the importance of science and mathematics in industrial arts as well as other subjects. ★

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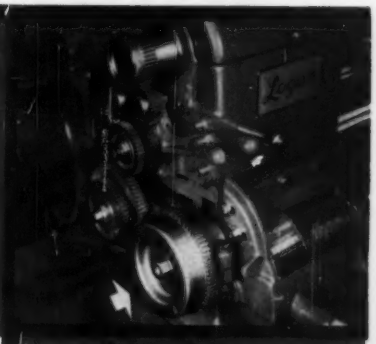
Automatic Safety Gear now standard equipment on 10" and 11" models



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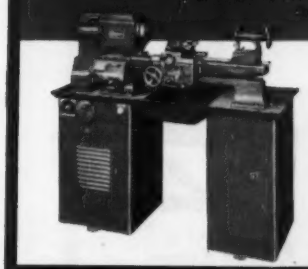

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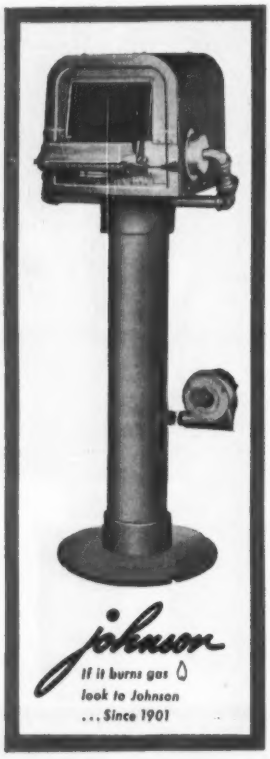

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From a contest entry to

A Business

By William A. Harper

Educational Affairs Representative, Ford Motor Company

A HANDMADE metal schoolchair entered by Jose Luis Sanchez, 18, in the *Concurso de Artes Manuales* (Mexican version of the Ford Industrial Arts Awards) did not win a prize, but it did set him up in business.

Mexico Minister of Education Jaime Torres Bodet spotted the chair among the entries in the first Mexican I.A.A. exposition in the fall of 1959. He immediately asked his aides to order 1,500 of the chairs.

Jose, a graduating student at the Heroes of Tlalnepantla High School, aided by his teacher, Albino Camacho, plus several schoolmates, started turning out the chairs in a tiny shop in the school. Orders piled up so they moved the operation to a shed behind the teacher's house. Sanchez says:

"We are finishing an average of 10 chairs per day. That's about our maximum unless we can get more tools, equipment, and a larger shop.

The chairs are entirely handmade. Sheetmetal for the writing surface, seat, backrest, and storage compartment is cut to size with large tin snips. Angle iron is shaped by hacksaw and file, and the chair is spot-welded with simple brazing torches.

What happens to the profit? The boys split it, to each in proportion to his share of work. Jose is planning to finance his civil-engineering education at the National Polytechnical Institute in Mexico City with his share. ★

Jose Luis Sanchez proudly displaying one of the chairs he is selling to Mexican schools.

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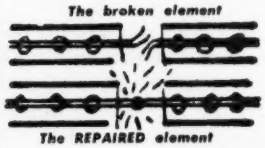
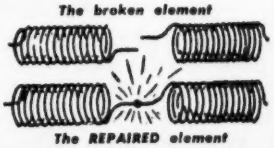
The broken element



The REPAIRED element

The broken element



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THE COURSE'S AUTHOR...
William A. Kavanaugh, B.S., M.S. PhD
Assistant Professor of Electricity—Radio Electronics, University of Minnesota

Dr. Kavanaugh's education in the field of Electricity, Radar, Electronics and related sciences has spanned nearly a quarter of a century. He has been a distinguished teacher of high school, college and adult classes for fourteen years. His contributions to the teaching profession have long been admired, and his abilities have earned him nationwide prominence in the Industrial Arts field.

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For Only the Dull?

TIMOTHY KELLY was one of the brighter freshmen in the local senior-high school. As he moved from one class to another he had to pass the machine shop. Each day he paused and gazed in admiration through the hall windows at the shiny machines and gadgets that were laid out there in orderly array. He was so entranced by the scene that he resolved that, when the opportunity arrived, he would elect a course that would give him the privilege of operating the equipment he had seen in the shop and that he admired so much.

In due course, the time arrived and Tim announced to his counselor that he wanted to elect Machine Shop I. This was a strange experience for the counselor, who was an academic teacher. He was aware that Tim was an above-average pupil, so he inquired why he was electing shop work. To which the boy replied, "I just want to operate one of those beautiful machines." From the point of view of the counselor this answer was far from satisfactory. He regretted that such a bright lad should waste his time on shop work when, from his record, it was quite obvious that he would be an all-*A* pupil in most academic subjects.

In an effort to direct the boy into what the counselor believed was a more desirable field of study, he pointed out that no one with an ounce of sense would work with his hands when he had the ability to earn his living by using his brain. He suggested further that only the dull pupils elected shop subjects, while the bright pupils, like Tim, invariably elected those subjects that tended to develop them culturally. Tim listened politely but, much to the distress of his adviser, he persisted in his original choice and elected machine shop.

Time passed and when the new semester began Tim found himself with 29 other pupils with similar interests, a member of a class in Machine Shop I. Unfortunately, there were 30 pupils in the class but there were only 25 machines. Moreover, a few of the machines were unsuitable for beginners. This meant that there was a group of pupils who, at least at the beginning, had to be assigned to work on the benches. This was not a new experience for the teacher, so he had arranged to have the members of this group chip and file a cast-iron block square, and to dimensions given on a blueprint.

This is a task that would make a strong man shudder, especially if he had never used a hammer and cold chisel on metal. The teacher assured the boys that as soon as machines became available they would be transferred to them. However, from the point of view of the youngsters, the chances appeared rather dim.

Tim was disappointed to find himself assigned to a bench but, being a determined lad, he proceeded with his task. He worked diligently. He chipped and filed for what seemed to him to be eons. He finally finished the job. It should be said in passing that he was the only one who did finish it.

Fortunately, he had a wise teacher who recognized that he had, in Tim, an individual whose skill and persistence would carry him far in the area of metalworking. Because of this, Tim was soon assigned to a machine. As time passed, he was moved to other machines until he had acquired an all-round experience in all of the operations available in the shop, and he was proud of it.

Tim is now a senior and he still elects machine-shop courses. At the same time he is studying physics and mathematics, and in his spare moments assisting the shop teacher in teaching others. Tim could develop into a high-grade toolmaker. However, he plans to enter his state university to prepare himself for the engineering profession, and his high-school experience in the school shop is sure to make more meaningful the profound theories to be discussed in his classes.

Who is there that will maintain that industrial arts, in our public schools, is intended exclusively for dull pupils?

Incidentally, Tim still treasures the metal block he chipped and filed. From reports emanating from his home, we understand that it is wrapped up in soft cloth and enjoys a prominent place among his other treasures in the top drawer of his bureau. ★

KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

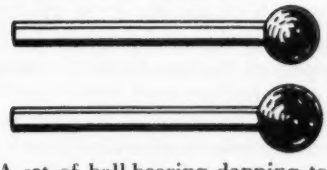
Chipboard Rack

Have you ever wanted a short strip or width of chipboard to use when cutting paper but didn't know where to find it quickly? Here is an answer to that problem, provided your graphic-arts shop's paper cutter has a void space under it: Build a chipboard rack for this space.

The rack shown in the photo above was built in 15 minutes to fit under a 30" paper cutter. It was made from scrap ½" and ⅜" plywood from the woodworking shop. The ½" stock was used for the sides and the ⅜" for shelving. The back was left open so that longer strips would fit. They stick out from the back but the front is flush with no scrap pieces of chipboard sticking out to cause a safety hazard.

It is well to bolt, or otherwise secure, the shelf unit to the frame of the paper cutter to keep it from tipping over when it becomes full. — *Ronald W. Adams, Herbert Hoover Junior-High School, San Francisco, Calif.*

Ball-Bearing Dapping Tool



A set of ball-bearing dapping tools for art metalwork can be easily made from discarded ball bearings and short lengths of ¼" octagon steel. Select a number of ball bearings of various sizes. Cut a like number of octagon steel or drill rod into, approximately, 2½" lengths. Hollow grind, to match the contour of each ball, one end of each piece of steel rod. This can be done by using a corner of the grinding wheel. Attach each ball to a steel rod with either silver solder or a low-temperature silver-alloy solder.—*Charles M. Rice, Western Washington College of Education, Bellingham.*

Heat Speeds Drying

If you have to speed up the drying of a gluing job, move the glued pieces closer to heat. An increase of 10° to 15° will cut drying time considerably. With white glues, soft woods may often be worked within a half-hour of gluing.—*C. Wayne Close, Glendale, Ore., High School.*

Seals Bottles Airtight

Bottles of photo chemicals can be made air tight by replacing the paper seals in the screwtop caps with rubber discs from old inner tubes.—*Harry J. Miller, Gillespie Junior-High School (on leave), Philadelphia, Pa.* ★

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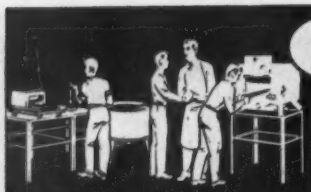

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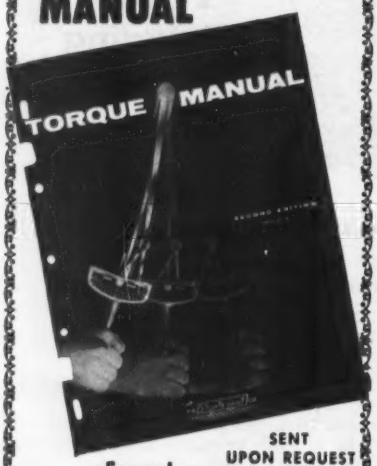

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News ABOUT TRAINING

The Technician

Nuclear Training Under Way

Two California institutions, Los Angeles Trade-Technical Junior College and Pasadena City College, are offering a unique course for technicians in the nuclear-power field covering plant operation, maintenance, power generation, and power transmission. The course covers the commercial development of nuclear energy, some principles of atomic structure and radiation, energy from matter, nuclear fuels, reactors and reactor control, and radiation protection methods. The outline for the course was prepared by the Stanford Research Institute at the request of the U. S. Atomic Energy Commission. A report on the results of the programs, entitled "Trial Presentations of a Nuclear Energy Training Course in Two Adult Vocational Education Programs," has been published by the institute.

Technician Literature Available

THREE new publications in the technical-education field have been announced recently. *What's in Your Future — a Career in Health?* describes career opportunities for technicians in health occupations. A copy may be secured for 25¢ by writing to Public Affairs Pamphlets, 22 E. 38th St., New York 16, N.Y. The second publication, *Opportunities in the Welding Industry,* points out the technician-level jobs in the welding industry, as compared to the usual opinion that welding work is restricted to the "highly skilled" level. The publication is available by writing to the American Welding Society, 33 W. 39th St., New York 18, N.Y. *Area Vocational Education Programs* is a reprint of an article in *School Life* written by Walter M. Arnold, director, area vocational education, United States Office of Education. The reprint is available from the U. S. Office of Education, Washington 25, D. C. The purpose of this article is "To inform school administrators about the nature and activities of the programs receiving federal aid under Title VIII of the National Defense Education Act, in the hope that it will help them use such programs to make significant educational contributions to their communities." ★

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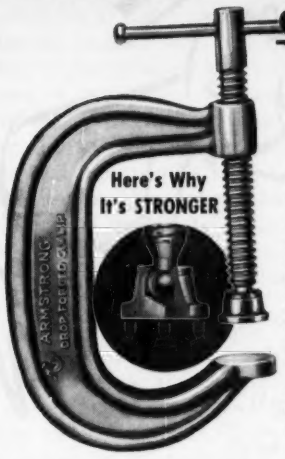

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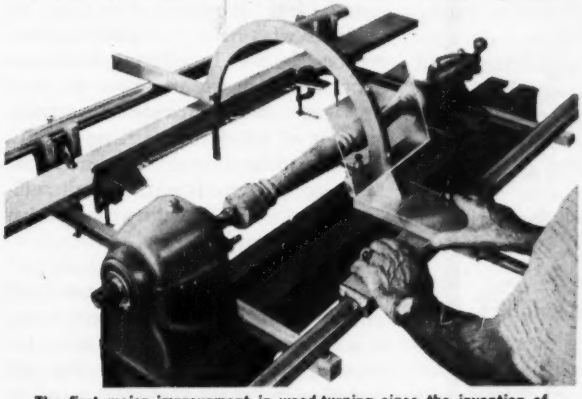

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AIR REDUCTION

A jack pot of ideas that will help you in

Promoting Industrial Arts "Across the Board"

By Maurice F. Foss

Assistant Professor, Industrial Arts Education,
Miami University, Oxford, Ohio

INDUSTRIAL arts is an area in general education, not a course. Because of this, we, as industrial-arts teachers, have many unique opportunities. There are new fields to explore, as well as well-known areas to develop further. Even more challenging is the opportunity to interest nearly every boy and girl in our schools in some phase of our technical society, help them to explore occupational possibilities, and to discover avocational interests. Furthermore, there is the need to contribute to consumer and social understandings, to develop cooperative attitudes and sound work habits. Our program is not the sole means through which the student's attitudes and character can be developed, but it has the possibility for making an important contribution to elements in their growth.

Some Limited Concepts

Unfortunately, some administrators do not fully appreciate the possibilities of this contribution. Recently, a group of administrators were asked what they expected the industrial-arts program to accomplish. The following remarks are typical of some of the responses:

"This is a rural community. We are not sure industrial arts has any value for our students."

"A large percentage of our students go to college. Industrial arts is not necessary."

"Our boys come from a professional class. Few of them will ever work with their hands."

"Very few of our students go to college. Industrial arts should be very popular."

"The boys have a choice of Latin or shop work."

These answers certainly illustrate a narrow concept of industrial-arts experiences. While it is theoretically true that a school administrator should be an educational leader, and have an all-embracing philosophy of education, it is also true that actual attitudes are largely determined by an individual's experiential background. Many school administrators have had limited first-hand experience with various phases of the industrial-arts program.

This situation is complicated further by an outcry for placing emphasis exclusively on the three R's. This may be a result of Sputnik, increased enrolments in school, and increases in over-all costs of education. Industrial-arts teachers should not only believe in their program, but should embark on a convincing job of "selling" their program to the student, administrator, and community. The industrial-arts teacher who is interested in expanding his program may find some of the following suggestions a point of departure for his plan of action.

Some Successful Procedures

The following procedures have been actually used by teachers. In practice, many teachers, who were considered successful, reported using several of them.

One teacher, whom we shall call *A*, had to straighten up a "mess" bequeathed him by his immediate predecessor. First, he had to get rid of "junk," which had been permitted to accumulate, and to restore the remaining equipment to usable condition. In addition, the industrial-arts program had acquired a poor reputation. Hence, it was necessary to approach the problem from many angles.

First, he arranged a display case in his shop and invited the art teacher to place in it material which showed good design. He encouraged his students to repair household articles. He constantly insisted on good standards of workmanship. He organized an adult, evening, hobby class. His superintendent, who had previously questioned the value of industrial arts in the school, was transformed to one of the most enthusiastic supporters of the program, and he felt, furthermore, that it was attaining many outstanding general-education objectives.

The problem of making the industrial-arts program attractive to students who have real potentialities can best be met by offering these students a challenging program. Activity by itself may provide a certain amount of relief from sitting quietly in a classroom several hours each day, but mere activity is not in itself sufficient. It should be both constructive and satisfying.

Teacher *B* offered such an opportunity for his students. He constructed many sample projects, which offered a wide variety of opportunities for varying degrees of skill. He also collected pictures of suggested projects from newspapers and magazine advertisements. In many cases, the advertised price was shown so that the boys had some basis for estimating the possible commercial value of each item.

In teacher *C's* shop, a student was observed diligently sanding off a first coat of finish to remove scratches from the wood. This boy cheerfully explained, "You can't get away with a thing in this shop." Being held to good standards of workmanship did

not discourage the student, but, rather, increased his interest and pride.

Teacher *D* had a senior-high-school class of students that included a variety of backgrounds and varying degrees of experience. He went about overcoming these disparities by having the students present special, individual reports on a variety of technical topics. Many of the boys made illustrative devices to explain their talks. Each boy reviewed the material with teacher *D* before making his report to class.

It is true that the best place to start selling a program is in the classroom, but some publicity also helps. Teacher *E*, for example, took over a shop which was badly run down, but he succeeded in motivating his boys to produce some outstanding work. Their projects were exhibited in the school, at the state industrial-arts convention, and in a prominently located downtown store, where full credit was given to the boys and the instructor.

Teacher *F* succeeded in "selling" his principal and several of the teachers in a large junior-high school. The result was that they—the principal and the other teachers—adopted the habit of stopping in the shop to see how the boys were doing. Many of the girls in this school, consequently, requested an opportunity to enrol in shop classes.

Teacher *G* sold his program so successfully that he has had to move into a much larger shop furnished with new equipment. He made it a practice to take his principal to district meetings where they observed good school exhibits, enjoyed the luncheon, and heard inspiring talks by district or state industrial-arts leaders. He discussed, also, outstanding students with his principal and pointed out what these boys were doing.

At an annual spring "open house," Teacher *J* placed samples of each boy's work in the exhibit. Two boys from each grade level were chosen to work in the shop during the open house. Older boys served as guides to show visitors around the shop and explain the activities. Teacher *J* also found local merchants willing to offer store-window display space during American Education Week.

Shop libraries are not always complete nor are they always up-to-date. Teacher *K* met this problem by examining a large number of books sent to him by publishers on approval. He started a complete card file on all books examined. On the basis of these notes, he planned to recommend several volumes for the school library. He also kept a similar file on films and filmstrips.

Teacher *L* developed many teacher-made visual aids, some of which showed successive steps for making projects. Each step was accompanied by a brief description of the activity involved. The aim of these aids was to assist students in developing an understanding of procedures to be followed, and the importance of an orderly procedure.

Opportunities for Growth

It is true that all school administrators do not understand the full potential value of an industrial-arts program. It is equally true that they may be interested in the value of the program to the student and the community. Hence, the teacher's function is much broader than merely to relay technical information to students. In the broadest sense, it is his function to aid in the maximum development of each student with whom he comes in contact. This task will be facilitated if the teacher can also do an intelligent job of selling his program to students, administrators, and the community. ★

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Pre-Engineering . *from page 13*

the practice gained making these useful articles, students are required to perform other machine operations on an experimental basis to prove certain mechanical principles, such as cutting threads according to mathematical calculation rather than by the "cut-and-try" method, planning and cutting gears, etc.

In addition to metalworking projects and experiments, students working in teams perform several series of experiments involving physics, chemistry, mathematics, and mechanisms. These experiments are a regular biweekly part of their class work, with half of the class participating each week. After performing an experiment from a workbook, the student is required to do some library research on the subject and to complete a written report.

Sample Experiment

A typical example of one of these experiments is taken from the series on metallurgy concerning the "crystalline nature of metals." In this experiment, the student first examines large, visible crystals of the zinc coating on galvanized steel. Next, a small piece of tin plate is etched by immersing it in a hydrochloric-acid solution, thus revealing the crystal boundaries dissolved by the acid. Steel crystals are very small and cannot be seen except through a powerful microscope, but the crystals of tin and zinc can readily be seen. (All metals are crystalline in structure and in any piece of metal these particles are made up of atoms arranged in a regularly repeated pattern.)

To continue the experiment, small pieces of cast-iron and steel bars are broken to reveal the crystalline structure at the breaks. (Steel changes its space lattice structure with the change from low to high temperatures and vice versa. Ordinarily the crystalline structure of steel is that of body-centered cubes, each composed of nine iron atoms. This form is magnetic. At approximately 1500°F the space lattice changes to face-centered cubes of 14 atoms and also loses its magnetism. Magnetic properties are explored in a later experiment.)

This experiment continues by proving that steel changes from a face-centered to a body-centered, cubic-lattice crystalline structure when cooled from high temperature. This last part of the experiment involves physical laws of gases and solids. A razor blade is heated over a Bunsen burner and quickly removed to a dark box. Soon a brief flash occurs. This phenomenon is known as "recalescence." (As the change takes place, wherein 9 atoms per cube occupy a space that 14 atoms formerly occupied, this change releases heat, causing this phenomenon.)

After the experiment, the students draw diagrams of the two cubic lattice structures, read the reference books provided for the purpose, and write up a report about their findings. These reports about experiments, plus reports about field trips, assigned reports about readings from trade journals and other publications, and the keeping of complete and extensive notes, comprise the homework assignments for the class.

Applications of Mathematics

Mathematics continually plays a dominant role in all of the class activities. It is one thing for a student to be able to perform the required steps in a mathematical equation, but quite another for him to be able to employ the same principles to new and practical applications.

Although algebra and geometry are prerequisites for this course, considerable relearning takes place in this class. Students become aware of a new meaning for mathematics as they apply it to solve problems that present immediate personal needs in their class work. The applications of algebra are common to almost all the machine operations in the shop; from the calculations of spindle speeds, automatic feeds, and the transposition of standard formulas to suit given operations, to the development of formulas, as in finding straight and angle depths of threads.

Working with gears, cams, and other mechanisms for the transfer of motion involves many principles of physics as well as plane geometry, as in determining angular velocities and vectors of motion that are generated when one gear transmits motion to another gear. Trigonometry has many applications in the class work, as in analyzing thread design, cutting-tool angles, gear-tooth and pressure angles, transfer of motion through linkage, the design of cutting tools for automatic machinery, use of the dividing head of the milling machine, taper and angle cutting with the lathe, and several others.

Not only do the students learn to put mathematics to practical use, but they are encouraged to think in terms of mathematics as a method of reasoning, to think and to attack problems by a logical approach. Needless to say, the student who learns to solve practical problems with mathematics, to write reports, and to practice using several references to obtain data for his work will have experienced a practical need for proficiency in the various school subject areas. The practical experience provided by this course,

"Aren't you even going to open the door Mr. Durdin?"

coupled with theoretical principles involved, will lead to student insight that will provide a fine orientation and motivation leading to further technical, engineering, or scientific study.

Suggested Steps for Starting an Accelerated Course

The selection of a suitable teacher for an accelerated course in pre-engineering machine shop is the first and one of the most important tasks. He needs all the attributes of any superior teacher, plus intimate, practical experience in engineering and machine-metal shop activities.

Second is the planning stage. Prior to starting the class, the course content has to be determined. Basic projects and experiments must be selected to illustrate in a practical way the mechanical and scientific principles involved. Suitable related theory and other meaningful information has to be arranged in appropriate areas with the intention of interesting the able student and stimulating his curiosity and desire for further study.

Third, and equally important, enthusiasm for the course must be generated in both the central office and local administration, the mathematics, physical-science, and counseling departments. In addition, it is important that other members of the industrial-arts department understand what is being attempted. The support of the groups mentioned has been an important factor in the successful development and continued operation of this project. In Oakland, this industrial-arts course is considered as laboratory science in allotting credit, therefore, easing the problem of college requirements for college-bound youth. The University of California recommends high-school machine shop for engineering students. It is expected that other colleges and universities will readily accept this course as college-preparation work.

Fourth, experience has indicated the advisability of establishing a cut-off point of 110 IQ as the lower limit of admission to this course. *However, the IQ score is not the only criterion for admission to this class. Recommendation of the mathematics staff and a personal interview by the industrial-arts teacher are used regularly to determine the selection of class members.*

Fifth, while students are graded competitively in this class, the grades that appear on their transcripts will be either A or B. Should a student not fulfill expectations, he is removed from this class. Grading is not a problem in these classes.

Conclusion

These pilot courses at Castlemont High School have proved to be outstanding successes. Students, parents, teachers, and administrators are enthusiastic about the program. Since the successful operation of this experiment, at least one neighboring city is conducting a similar program. College-preparatory students have responded enthusiastically to this new type course designed specifically for their abilities and needs and providing fast-moving, meaningful activity and challenge.

School districts have a great opportunity and responsibility to offer an industrial-arts course providing fundamental engineering and scientific insight and stimulation to *able* students in their schools.

EDITOR'S NOTE: A bibliography of reference texts and periodicals useful in organizing and teaching a pre-engineering machine-shop course to talented high-school students is available by writing to Dr. Glenn I. Newhouse, Supervisor of Industrial Arts, Oakland Public Schools, Oakland 6, Calif. ★

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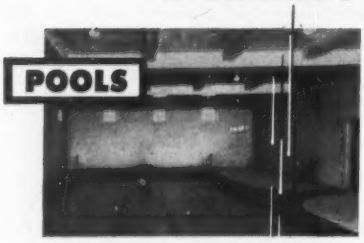

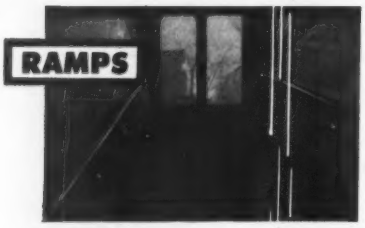

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Books:

Ceramic Handbook. Hyman. New York: Arco Publishing Co., 1959. Pp. 144. $2.50.

This handbook is considered to be a standard guide in the field of ceramics. It contains a pictorial presentation showing, step by step, how to make all types of pottery.

The author discusses the various types of clay, and the tools and equipment needed in the craft. From this he proceeds to sculpturing, the construction of molds, casting, decorating, and firing. In addition, he deals with glazes and glazing, and explains the construction and use of a potter's wheel.

While the book will be valuable to students of pottery in a school, it was designed primarily for the hobbyist.

Richard Hyman is a noted lecturer on ceramics and he is engaged in supplying schools with ceramic equipment, much of which he designed personally.

Ferrous Metallurgy. Umowski. Chicago: American Technical Society, 1960. Pp. x + 83. $2.25.

This is a laboratory manual which is intended to serve those individuals who require advanced information on the heat treatment of steels.

The experiments included in the manual are written in a fashion that permits the instructor to substitute other alloys for those listed in the problems. The student, too, with the approval of the instructor, can use alloys different from those called for.

The book will be of special value to technical personnel who have had no investigative experience. They can become familiar with the scientific approach and, thus, be better prepared to interpret the reports that come to them from the laboratory.

Joseph S. Umowski is state director of technical education in New Jersey.

Soldering Manual. New York: American Welding Society, Inc., 1959. Pp. ix + 170.

The material presented in this manual represents the latest factual information on soldering. The data included has been arranged in an order that should enable those interested in the subject to proceed from the basic principles to the more difficult task of deciding how any specific soldering job should be done.

Some topics dealt with are solders, fluxes, joint design, inspection and testing, printed circuits, among many others.

In view of the fact that this volume was prepared under the sponsorship of the National Welding Association, it should be accepted as a standard work on soldering.

Precision Measurement and Gaging Techniques. Grohe. New York: The Chemical Publishing Co., 1960. Pp. 222. $7.50.

The primary purpose of this book is to acquaint the reader with the most up-to-date instruments, methods, and techniques used in gaging. The author has made an effort to include the latest developments in inspection and gaging.

A study of the basic material included should provide a sound foundation for the beginner in acquiring knowledge and skill in the field covered. The book should be valuable in advanced machine-shop classes. It should be especially useful to industrialists in training personnel in the use, care, and wear of precision instruments.

Machine Shop Operations and Setups. (Second Edition). Porter, Lawshe, and Lascoe. Chicago: American Technical Society, 1960. Pp. xii + 449. $5.50.

In this second edition the authors have omitted practices that are outmoded and have introduced many new widely-used operations.

The contents have been modified to meet the demand for greater emphasis on operations and setups, and a section has been added dealing with grinding operations.

The reader will find in it a discussion of the construction and the capacity of each machine, the different types available, and the work-holding devices used on each.

Anyone whose duties are related to production machinery will find the volume to be an excellent reference.

Harold W. Porter is professor of industrial education, Kansas State College, Pittsburg. Charles H. Lawshe is dean of extension work, Purdue University. Orville D. Lascoe is professor of industrial engineering, Purdue University.

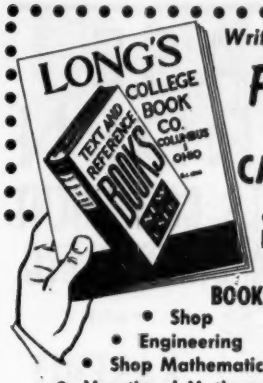
Architectural Rendering: The Techniques of Contemporary Presentation. Halse. New York: F. W. Dodge Corp., 1960. Pp. x + 277. $15.75.

This is a comprehensive manual which covers all the media of architectural delineation. It contains beautifully illustrated explanations of every technique and medium used in rendering today. Numerous examples of work in each medium are included.

In addition, suggestions are offered concerning the selection of equipment, about methods of mixing inks, about applying charcoal, and about using an airbrush.

Architects, teachers, designers, and pre-architectural students will find the book to be an excellent reference for their work.

Albert O. Halse has had wide experience as a designer and architect, and for many years he has been a member of the architectural faculty at Columbia University, New York City.



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Pamphlets:

Industrial Arts for the Middle Grades is a 163-page course of study for Grades 7, 8 and 9, published by the Office of Industrial Arts Education, Georgia State Department of Education. For information about this publication write the Office of Industrial Arts Education, Division of Vocational Education, State Department of Education, Atlanta, Ga.

Mathematics and Industrial-Arts Education is a 112-page bulletin published by the California State Department of Education which is designed to assist in the improvement of instruction in mathematics courses relating to industrial arts as well as the practical application of mathematics in each area of industrial arts in grades 7 through 12. The material was developed as a project under the NDEA by the Mathematics-Industrial-Arts Project Committee. Available from the Bureau of Textbooks and Publications, 721 Capitol Ave., Sacramento 14, Calif., for $1.00.

Basic Technical Symbols and Their Definitions are covered in a series of four, large wall charts available from the Eberhard Faber Pen and Pencil Company. The charts, printed on 23" x 29" cardboard stock, cover electronic symbols, modern house design symbols, basic engineering drawing symbols, and building materials symbols. Charts available free for shop classroom use from Eberhard Faber Pen and Pencil Company, Crestwood, Wilkes-Barre, Pa.

Audio Visuals:

The Modern World of Industrial Arts is the title of a 12-minute, sound-color movie being produced by the Virginia State Department of Education. The film presents the philosophy of industrial arts and shows why a general-education curriculum includes a course in the workings of modern industry. For information write the Virginia State Department of Education, Richmond.

It's Almost Tomorrow is a 16mm, sound-color movie, produced by The University of Texas, showing how clubs for vocational-industrial students are assisting in preparing youth to become productive leaders of tomorrow. Available from Industrial Education Department, Division of Extension, The University of Texas, Austin. $100. Also available on rental basis.

Putting a Job on the Platen Press is a 28-frame filmstrip, correlated with a 16mm film of the same title, depicting the steps necessary in getting a simple job on the press, from inking to getting the instructor's approval. Available from Robert E. Appleton, Jordan Junior-High School, 420 S. Mariposa, Burbank, Calif. $3.50.

Learning to Set Type is a 16mm, b & w, sound movie demonstrating the basic principles of typesetting and distribution for beginning students. Available from Bailley Films, Hollywood 28, Calif. $60, purchase; $3, rental.

The Drama of Metal Forming is a 28-minute, 16mm, color movie which is said to "show more of the inside of a steel mill than you could see if you went through the mill itself." Available free from Shell Oil Company, 50 W. 50th St., New York 20, N. Y.

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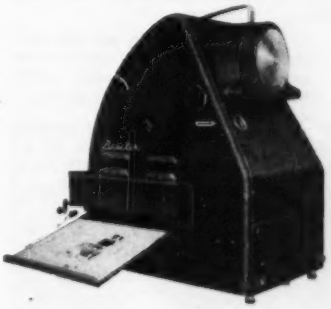

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happenings in industrial education

AIAA Crosses Border for 22nd Meeting

MEETING for the first time outside of the United States, the 22nd annual convention of the American Industrial Arts Association was held April 19-22 at Toronto, Ontario, Canada, with the appropriate theme, "International Understanding; Implications for Industrial-Arts Education."

New president of the AIAA is Ivan Hostetler of North Carolina State College, Raleigh. Other officers elected were: first vice-president, M. J. Ruley, supervisor of industrial arts and vocational education, Tulsa, Oklahoma; vice-president for supervisors, Robert L. Woodward, consultant for industrial arts, California State Department of Education; and vice-president for teacher educators, Donald Maley, industrial-arts department head, University of Maryland.

Giving significance to the general sessions and sectional round-table discussions of the international aspects of industrial arts was the hospitality of the Ontario industrial-arts teachers who were hosts of the convention.

Appropriately enough, Donald M. M. Ritchie, Parry Sound, Ontario, industrial-arts teacher, was named president of the Ontario Education Association which met at the Royal York Hotel just prior to the AIAA convention.

John H. Furbay, director of the International Association for Air-Age Education of Trans-World Airlines, gave the opening convention address in which he emphasized isolation no longer exists among nations and predicted that Africa will be the greatest surprise of the twentieth century, with more progress in one generation than Europe experienced in a thousand years.

Allan Jarvis, editor of *Canadian Art* and former director of the National Gallery of Canada, spoke on influences of international art on design and showed how modern painters and sculptors influence the design of furniture and of buildings.

The final formal program was a debate on "Resolved: that education is justified in promoting world-wide industrialism" with five Canadian participants and one from the United States. The six debaters represented

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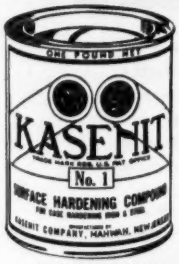

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Following the convention banquet, the Ship's prizes were distributed by the 71 commercial exhibitors at the convention and a "Man of the Year in Industrial Arts" award was presented by the Ship to Chris H. Groneman, head of the department of industrial education at Texas A. and M. College.

Prior to the convention, meetings were held by the American Council on Industrial-Arts Teacher Education and the American Council of Industrial-Arts Supervisors. New president of the teacher-education group is Donald Maley, University of Maryland. Honorary life memberships were given to Dean R. Lee Hornbake, University of Maryland, and Elroy W. Bollinger, New York State Education Department. Named "Man of the Year in Teacher Education" was Ray M. Karnes, head, industrial-education department, University of Illinois, and immediate past-president of the AIAA. The ninth yearbook of the council, *Research and Industrial-Arts Education*, was presented to the group.

New president of the American Council of Industrial-Arts Supervisors is Robert L. Woodward, California State Department of Education. A proposal was brought before the group to prepare a supervisor's handbook to help bring about a better understanding and improvement in industrial-arts education.

Attendance was about a thousand in spite of the conflict of dates with several state associations. The 1961 convention will be held in St. Louis, Missouri, at the Chase-Park Plaza Hotel, April 4-7. ★

CONVENTION CALENDAR

Georgia Vocational Association, Atlanta Biltmore Hotel, Atlanta, June 9-10.

Colorado Vocational Association, Colorado State University, Fort Collins, June 13-17.

Pelican State Vocational Association, Southern University, Baton Rouge, July 5-8.

Conference on Printing Education of the International Graphic Arts Education Association, University of Houston, Tex., Aug. 14-19.

Louisiana Vocational Education Conference, Monroe, Aug. 18-20.

Ohio Vocational Association, Southern Hotel, Columbus, Oct. 7-8.

Minnesota Vocational Association, Pick-Nicollett Hotel, Minneapolis, Oct. 20-21.

American Vocational Association, Los Angeles, Dec. 5-9.

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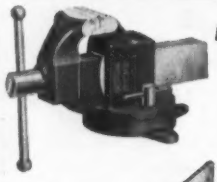

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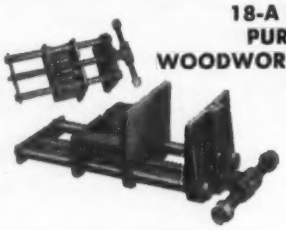

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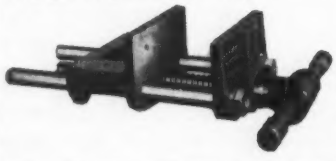

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

Fred Gross of Stanley Retires

Mr. Gross

After completing 50 years of service with Stanley Tools, New Britain, Conn., Fred Gross is retiring this month as Manager, Educational Department. A pioneer in the field of school relations for industrial firms serving the schools, Mr. Gross is known from coast to coast for his contributions to the upgrading of school shops and their facilities. His knowledge of shop planning has aided many school people laying out new shops or remodeling old ones.

Always a friend of industrial education, Mr. Gross appeared before boards of education on behalf of shop programs and developed a number of useful teaching devices which are distributed by Stanley Tools. Through his travels throughout the nation and appearances at literally thousands of conventions of shop teachers he has built up a host of friends in industrial-education.

SPS Horizontal Storage Rack Designed for Maximum Visibility

A horizontal storage rack for lumber, pipe, and other heavy shop materials is a new product of the Columbia-Hallowell Division, Standard Pressed Steel Co.

Built of heavy duty ⅛" and ¼" steel fabricated in box channel construction, the new storage rack, SPS designers claim, gives maximum visibility of material stored on each of its five horizontal levels.

The basic model of the storage unit measures 12'4" wide, 8'4" high, and 3'4" deep, the company states.

For more information write the company, Box 981, Jenkintown, Pa., mentioning SCHOOL SHOP; or *circle no. J-1 on the business-reply card.*

Ditto Announces Model D-21, Budget-Priced Duplicating Machine

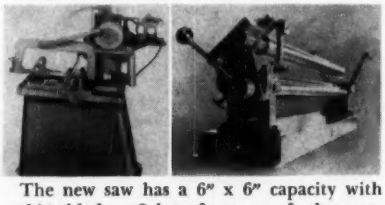
Ditto, Inc., has announced the introduction of a budget-priced, electric duplicating machine able to reproduce 120 clean-cut copies a minute of anything typed, written, drawn, or traced.

The new machine, Model D-21, can deliver 300 to 500 sharp copies in one to five colors from a single Ditto duplicating master on any weight paper, the company points out. Paper size can range from 3" x 5" to 9" x 14", the firm adds.

For more information write the company, Harrison at Oakley, Chicago, Ill., mentioning SCHOOL SHOP; or *circle no. J-2 on the business-reply card.*

Berkroy Announces New Hacksaw and Complete Line of Slip Rolls

Two new products have recently been announced by Berkroy Products Company — a #3 Hi-Speed Hacksaw and a complete line of slip rolls.



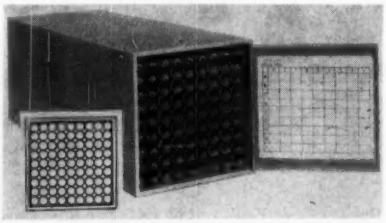
The new saw has a 6" x 6" capacity with a 14" blade. Other features of the saw, pointed out by the company, include: lift on the return stroke by a simple lever pressing against a smooth rack, which means no teeth to wear; ball-bearing guides to reduce friction; automatic switch to stop the motor at any desired depth of cut; and angle cutting by turning the saw instead of the work.

Berkroy's new line of slip rolls comes in five sizes—12", 18", 24", 30", and 36". They feature, the company points out, a cam lift for quick removal of material and finger-tip controls to permit fast and accurate adjustment for any material thickness within the capacity range of the slip roll. The feed and forming rolls are 2" in diameter.

For more information on the new Hi-Speed Hacksaw and the new slip rolls write the company, 1171 E. 32nd St., Los Angeles 11, Calif., mentioning SCHOOL SHOP; or *circle no. J-3 on the business-reply card.*

81-Tube Staktube for Prints Added to Line by Stacor

The new 81-tube Staktube File is designed to permit quicker filing-and-finding of rolled prints and charts, according to Stacor Equipment Company, manufacturer.



The company states that the new tube size combines maximum space utilization with maximum protection, keeping individual drawings neat, clean, and in order, and preventing mutilation from unnecessary handling in use and storage.

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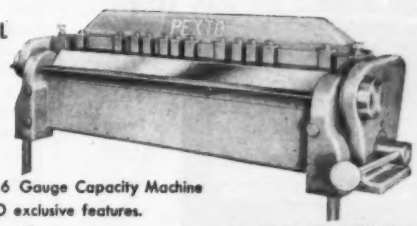

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M.E. Generator listed above can be purchased separately. Makes deluxe heavy-duty welder comparable to the finest commercial welders available. Wt. 90 lbs. Approximate GOVT. COST $600. Gen. alone—$49.50.

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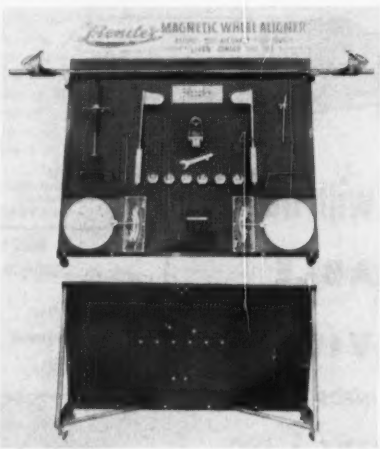
For more information write the company, 295 Emmet St., Newark 5, N. J., mentioning SCHOOL SHOP; or *circle no. J-4 on the business-reply card.*

Bender's New Rollaway Tool Board Comes with Wheel-Alignment Equipment

A "rollaway" tool board, complete with portable wheel-alignment equipment, is now available from J. H. Bender Equipment Co., Inc.

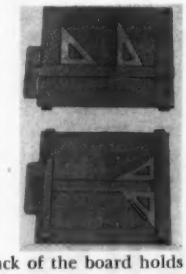


The tool board contains all the necessary equipment to teach basic wheel alignment, the company points out. It includes a camber and caster gage and a toe analyzer gage that attach magnetically to the wheel hub, portable floor turnplates, steering wheel holder, hub and dust cap remover, and a wrench set.

The company declares that with this equipment the students can learn to check alignment and make corrective adjustments on 80 percent of the cars that need alignment. The rollaway feature of the board allows the equipment to be moved easily between the classroom and work areas, the company points out. The tool board measures 48" x 60".

For more information write the company, 5430 Tweedy Blvd., South Gate, Calif., mentioning SCHOOL SHOP; or *circle no. J-5 on the business-reply card.*

Drawing Kits in Four Sizes Being Marketed by Alvin & Co.



Drawing kits in four popular sizes are now being offered by Alvin & Company, Inc. The kit consists of a clear, lightweight basswood drawing board with a finished fixed head, a maple wood T-square, and two transparent triangles, the company reveals. A built-in T-square holder on the back of the board holds the triangles in place when not in use. Each kit is supplied with a waterproof plastic envelope jacket.

The kits are available in the following sizes, the company reports: 10" x 12"; 13" x 19"; 17" x 22"; and 19" x 25".

For more information write the company, 611 Palisado Ave., Windsor, Conn., mentioning SCHOOL SHOP; or *circle no. J-6 on the business-reply card.*

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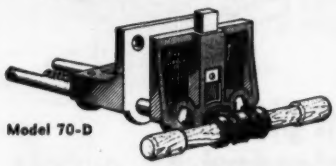

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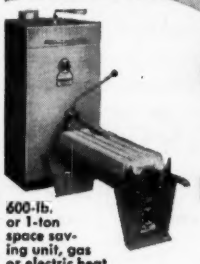

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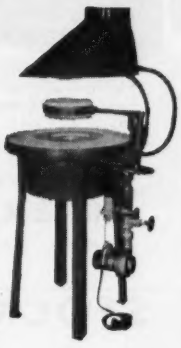

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The new Rice-Milwaukee Model PDM punch and die maker, recently introduced by Rice Pump & Machine Company, is designed to handle all small die-making requirements, according to the manufacturer.

Features of the new model, the company states, include: tilting stroke mechanism, tilting table, infinitely variable speeds and strokes, and both upper and lower arms power operated. Two table sizes are available, a standard 20" square table and a 24" x 28" table.

For more information write the company, Belgium, Wis., mentioning SCHOOL SHOP; or *circle no. J-7 on the business-reply card.*

New Literature:

Catalog DK-820 is a new 16-page catalog available from Hammond Machinery Builders, Inc., which describes practical effective ways for solving dust, dirt, and mist collecting problems. Detailed explanations of how to achieve maximum results with various models in the line of Hammond Duskolectors are contained in the catalog, as well as general application information. For a copy write the company, 1676 Douglas Ave., Kalamazoo, Mich., mentioning SCHOOL SHOP; or *circle no. J-8 on the business-reply card.*

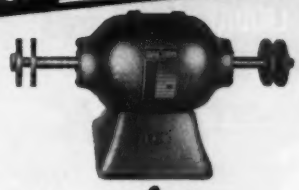
Short Course for the Novice License is a four-page pamphlet issued by EICO which can be used by vocational and electronics teachers as a handy primer for potential amateur radio operators. The brochure lists the Morse Code and contains general information regarding FCC requirements for becoming a "ham" operator. For a free copy of the pamphlet write the company, 33-00 Northern Blvd., Long Island City 1, N. Y., mentioning SCHOOL SHOP; *or circle no. J-9 on the business-reply card.*

Spray Painting with the Electrostatic Hand Gun is a 12-page brochure published by Ransburg Electro-Coating Corp. It describes and illustrates the uses of the Ransburg new hand gun, which uses electrostatic forces, instead of compressed air, for atomizing and applying liquid coatings. Advantages of this type of painting are pointed out. For a copy write the company, Box 23122, Indianapolis 23, Ind., mentioning SCHOOL SHOP; or *circle no. J-10 on the business-reply card.*

Washington . . . *from page 48*

give the impression that the White House Conference devoted itself entirely to vocational education, let's add that this huge, intricate meeting dealt with about 210 other topics as well. Mostly, the delegates bemoaned our values—"the crisis of our times is the worship of things". Next, they

Specially Designed for Student Safety!



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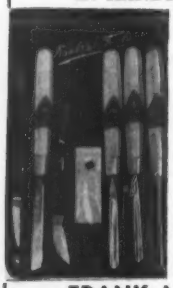

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endorsed the home—"it is still the most stabilizing force in the upbringing of children". They also approved of better education, more and better services for the gifted, slow-learning, handicapped, migrant, slum child, and the child in trouble with the police. They resolved in favor of federal aid to education, in favor of a stronger U. S. Children's Bureau, in favor of better TV programs for children, in favor of more state and national recreation parks.

But the theme of helping youngsters become efficient wage earners of the future bobbed in and out of the forums, assemblies, and workshops in which the delegates spent six days (March 27-April 2). Even an abbreviated catalogue of the facts and recommendations presented at these meetings on this theme would fill several pages. Let's take a sampling. The delegates declared that:

1. There is a severe shortage of counselors who have the personal touch. We need 15,000 counselors this year, but school systems will be able to employ only 6,000.

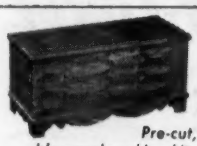
2. The U. S. Employment Service, with its 1,800 offices across the country, is interested in helping high-school graduates about to enter the labor market. The U.S.E.S. claims it has counseling and testing services to help young people make wise job choices.

3. State laws should be changed to remove the requirement of classroom teaching experience for vocational guidance counselors.

4. Educators should go to management and labor to find out the prerequisites for training in the new job families "in these times of rapid automation and changing occupations."

5. Negroes are being deprived of apprenticeship training opportunities. In a broad resolution, delegates emphasized that all racial barriers to opportunity should be wiped out.

6. On child-labor laws, delegates had mixed feelings. One school of thought was that the child-labor laws should be changed to permit children under 16 years to work longer hours during summer vacations. Others proposed "bending" the child-labor laws a little to permit youngsters to attend school in the morning and work in the afternoon. The consensus of several workgroups was that the child-labor laws are still much needed but that they should not be used to prevent youngsters from getting their hands greasy and learning the habit



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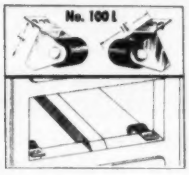

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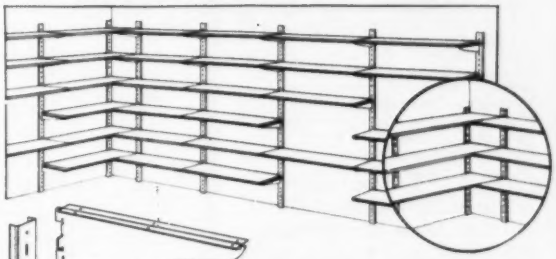

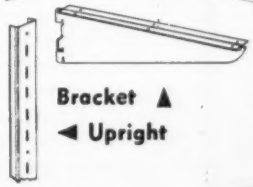

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of labor. But the final resolutions called for strengthening child-labor laws and tighter enforcement procedures.

The flow of resolutions did not end there. The delegates further resolved that:

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In all, delegates approved 1,600 resolutions, set up a National Committee for Children and Youth to follow up their recommendations, and went home asking themselves, and each other, "What have we accomplished? What have we really accomplished?"

Unfinished Business.—A pile of unfinished business faces Congress. With the Easter recess behind and the political party conventions ahead, Congress must dispose of several major bills within the next 30 to 40 days.

Near the top of the list is the question of federal aid to schools. The Senate has done its work, having passed a highly controversial bill providing for school construction and teacher salaries. The House isn't sure it will approve even school construction grants alone. The Senate has also sent to the House bills dealing with appropriations for 1961, juvenile delinquency, civil rights, and training for so-called cold-war veterans. The attention of observers during the next weeks, therefore, will be on the House. The Senate, like a boy who has finished his assignment ahead of class, will be sitting and waiting for the laggards to catch up.

Of the bills listed above, two call for comment. The civil-rights bill is tinged with educational implications, because its provisions could be used to speed school-integration cases. Title I, for example, provides for "a

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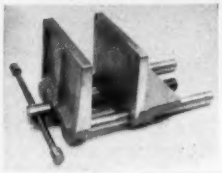

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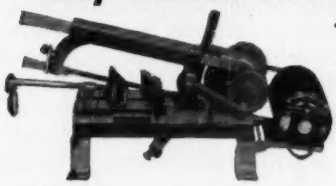

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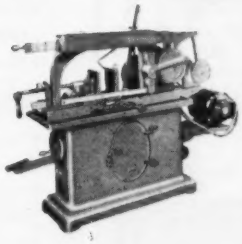

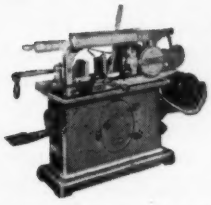

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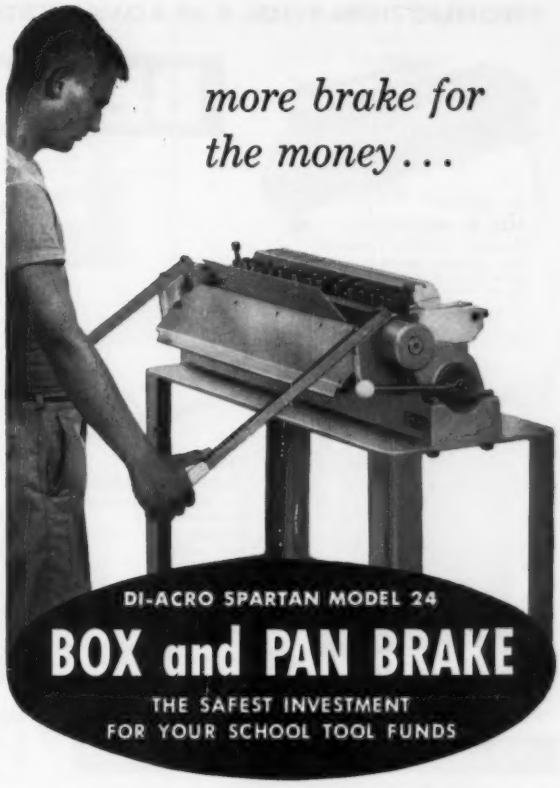

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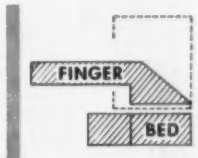

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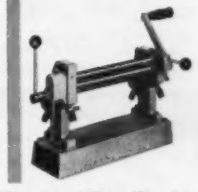

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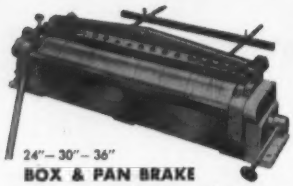

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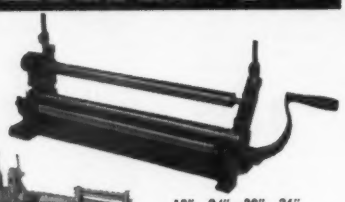

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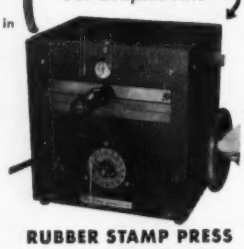

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fine or jail sentence for persons obstructing any federal court order, including court orders arising out of segregation cases." Title II provides for even heavier fines and jail sentences for persons who cross state lines to avoid prosecution in connection with bombings of public buildings, including schools. Finally, Title V authorizes the U. S. Commissioner of Education to set up schools for children of military personnel in areas where public schools are closed because of racial disputes. These provisions are all the "liberal" Senators could get through and all the southern Senators would allow. But even so, the Senate action has been called "historic"—and now that the House has passed the bill, the federal government will have additional weapons to press a policy it has supported consistently since 1954 – a policy of doing all it can to enforce the U. S. Supreme Court's opinion on segregation.

The bill seeking training and other benefits for cold-war veterans (S.1138) is giving House members uncomfortable moments. No lawmaker wants to be disrespectful to members of the armed forces, whether in peace or war. But the measure before the House – the Senate has already passed it—would cost $500 million a year and many a Congressman can't bring himself to voting benefits costing that much for men who have not been subjected to the hazards of war.

The Eisenhower Administration has opposed the bill because (1) the proposed expenditure is not in line with the President's economy and budget policies and (2) because the Administration can see no comparison between peacetime and wartime service. The Eisenhower policy is: "We see no reason for expanding public funds to provide benefits to a person who is merely discharging his obligation to his country without suffering any wartime risks." Naturally, the Veterans' Administration and the Department of Health, Education, and Welfare follow this line and have opposed the legislation.

Vocational educators, however, have been supporting the measure. One reason is that it would bring to trade- and vocational-training stations hundreds of thousands of young men during the next two to three years. The post-Korean veterans' population stood at 687,000 on December 31, 1958. By July 1, 1963, the termination

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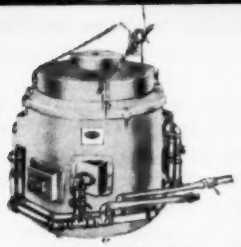

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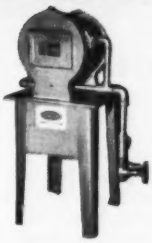

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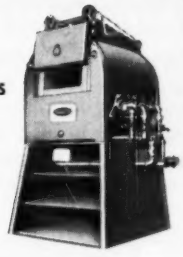

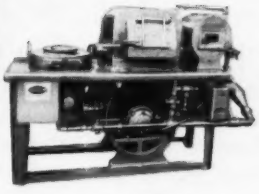

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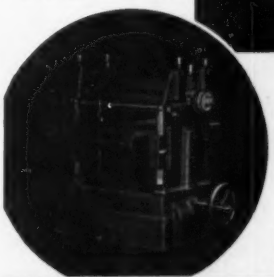

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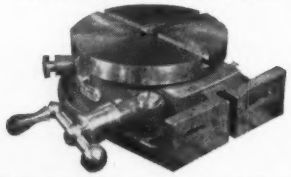

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date on eligibility under the pending legislation, almost four and a quarter million post-Korean veterans will have been separated from the military establishment. About half of these would probably enrol in vocational and training courses, if the bill should pass.

The measure also has staunch supporters in the House. One of these is Rep. Wright Patman (D., Texas) who is tireless in pointing out the bill's virtues. He says that the young men who serve, or will serve, between January 31, 1955, and July 1, 1963 (the two dates represent the end of the Korean GI Bill of Rights and the end of the compulsory draft law), are the forgotten men of our defense program.

Rep. Patman argues that the peacetime draft operates in such a way that those who are subject to it become "relegated to the status of second-class economic citizens." "During their military service," says Mr. Patman, "the draftees drop farther and farther behind, while their contemporaries who stay in civilian life advance themselves educationally and economically." The peacetime draftee is thus a "victim of the peace," he is trapped, he is denied the fruits of our free economy, Mr. Patman argues. The way to correct such inequities is to provide training benefits for cold-war veterans.

While there is sympathy for Mr. Patman's point of view in the House, many of its members cannot quite accomplish that stretching of the mind which would regard peacetime draftees in the same class as wartime fighters. That's quite a jump for the mind to take. It would bring the lawmakers to that point of view, already proposed by some, that young men and women serve the national interest not only by military duty but also by staying in school and by preparing themselves for skilled occupations. Hence, the federal government should help all young men and women by broadened programs of federally supported general and vocational education.

Well, that would take us quite a way from the historic devices of soldiers pensions and GI benefits. It would bring us to the threshold of broad federal aid for post-high-school education. A good many Congressmen are not yet ready to step over that threshold.

Politics Anyone?—Have a good sum-

mer. And if you wish to indulge in a bit of political activity in this election year, go right ahead. The Hatch Act? Nothing to worry about. Although the Hatch Act of 1939 restricts the political activities of federal employes, it has no bearing on state employes who take part in federally-supported activities, such as the Smith-Hughes and George-Barden programs. Where is the authority for this statement? The amendment to the Hatch Act enacted in 1942. It reads as follows: "This section shall not prohibit or make unlawful any act by any officer or employe of an educational or research institution, establishment, agency, or system which is supported in whole or in part by any state or political subdivision thereof, or by the District of Columbia, or by any Territory or Possession of the United States; or by any recognized religious, philanthropic, or cultural organization."

And if any one should ask, tell them you're citing Public Law 754, 77th Congress (1942). ★

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from Washington

by Michael Paca

The Shock Treatment of Work. — There have been five White House Conferences since 1909 (one a decade) on children's problems. The earlier ones were dedicated to the proposition that young children need protection from what seemed to social workers a cruel and hostile world. As a result, the first three of these affairs were largely responsible for framing and assuring the enforcement of child-labor laws.

Times have changed. At the 1960 White House Conference on Children and Youth, delegates debated the proposition whether we should ease up, rather than tighten, the provisions governing the employment of youngsters.

Said California delegate Charlotte D. Elmott, a guidance worker in the Santa Barbara city schools: "We have enacted child labor laws to protect children from exploitation. But haven't the children become overprotected over the years? Haven't the very laws we have enacted for their protection become barriers to their participation in work activities that are essential to their development?" And Miss Elmott added that "in spite of us and our child-labor laws, 5 million teen-agers have gone to work in the civilian labor market."

A good many of the delegates who heard these statements nodded their heads in agreement. They also agreed with New York delegate Howard Seymour, superintendent of schools for Rochester, who said: "Some youngsters need the shock treatment of work experience."

AFL-CIO President George Meany did not hear these comments. But he had anticipated them. In one of the major talks to the Conference (there were 194 such big-name talks), Mr. Meany said that the "line about child labor is subtle today." He charged that public-relations counsel for industries which seek to employ children talk in terms of "training" them for future advancement. Having warmed up to his subject, he said:

"They (some industrialists) say we have gone too far in protecting our children and have, in fact, barred them from opportunity. The truth is just the opposite. We have not provided half enough protection for our children. Thousands of them work in hazardous occupations because the federal law does not protect them, and the state laws are woefully inadequate."

Next, Mr. Meany turned his attention to the argument of work experience for children who show little scholastic aptitude. In his words:

"The theory is that such work experience will provide an adequate substitute for continued education. This is an indirect but dangerous attack against our system of universal, free education and must be sternly repelled. The educational effect of the work experience to which children are subjected, for the most part, proves harmful in the extreme. They need more and better schooling, not less, in order to develop their full potential productive and earning power."

Mr. Meany also took occasion to tell the White House Conference what he thought of vocational education:

"Much can be done to help young people who are mechanically inclined through the improvement and expansion of vocational education. Unfortunately, many vocational schools are far behind the times in equipment and teaching methods. It would take a comparatively small investment to bring them up to date, through consultation with labor and management. They would then complement the widespread and effective apprenticeship programs which form the cornerstone of the training of the nation's skilled workers."

And while we were listening to Mr. Meany, we made notes to see whether he has changed his attitude toward vocational-technical training. Report: no change. Mr. Meany still refers to "misguided attempts to turn out half-trained technicians through quickie one- or two-year programs." And there was no one among the 7,500 delegates attending the White House Conference to challenge his views.

Conference Resolutions. — Lest we

(*Continued on page 39*)

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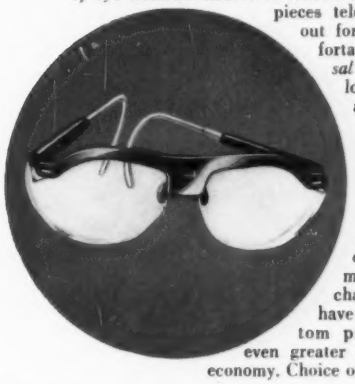

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